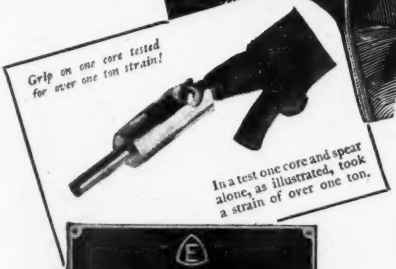
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXI. No. 3394 DECEMBER 11, 1942 6d. WEEKLY

ELLISON

Plug and Socket Connectors *for Electric Trailing Cables*


Grip on one core tested for over one ton strain!
In a test one core and spear alone, as illustrated, took a strain of over one ton.

WHEREVER trailing cables are in use there you will find the reliable and robust Ellison plug and socket Connectors. They have been in use for many years on slipways, docks and quays, in quarries and mines — successfully withstanding extreme conditions of weather and wear.
Ellison Connectors are practically indestructible.

GEORGE ELLISON
LIMITED
BIRMINGHAM 22B ENGLAND

478

DECEMBER 1942—the struggle increases; the fields of battle spread; millions of human souls are harnessed to the machinery of war—is this the time to speak of Peace and Goodwill?

Why not?

Must the gloom of to-day dim our eyes from the joys of to-morrow? Do we not travel hopefully in the knowledge that right is might; that the torrents of blood will cease to flow and that tranquillity will be restored?

With confidence in the future we at BRITISH ROPES LIMITED send Greetings to all our friends—may December 1943 justify the revival of the Christmas spirit.

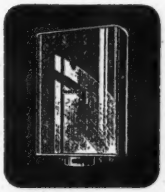
BRITISH ROPES LIMITED

HEAD OFFICE DONCASTER

HEATRAE

AN ESCUTCHEON HELD HIGH FOR CHARACTER

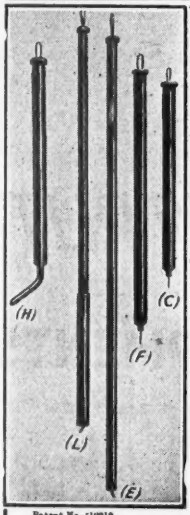
The acid test of character (whether in a man or a piece of mechanism) is ability to do a job properly.



We have always made it our job to see that our products do theirs . . . efficiently.

Leaders in Electric Heating

HEATRAE LTD., NORWICH • PHONE: NORWICH 25131 • GRAMS: HEATRAE, NORWICH



IS IT ALIVE?

THE "PARTRIDGE" PRESSURE DETECTOR

(Regd. T.M. No. B.581955)

will infallibly tell you, giving visible and audible indication

(No earth connection required)

Type	Range up to	Length of handle
C	Volts 11,000	36"
E	60,000	84"
F	15,000	48"
H	11,000	36"
L	33,000	72"

Also makers of "Westminster" Vacuum Tube Detector and H.T. Earthing Rods

Patent No. 519919

The WESTMINSTER ENG. Co. Ltd.

Victoria Road, Willesden Junction, N.W.10

Telephone: Willesden 1700-1

Telegrams: "Regency, Phone, London."

TAG TERMINALS

FOR WIRELESS AND SIMILAR CONNECTIONS

A WIDE RANGE OF SIZES IN STOCK

ROSS COURTNEY & Co. Ltd.

ASHBROOK ROAD, LONDON, N.19

BEARINGS

to the specific requirements of our customers.

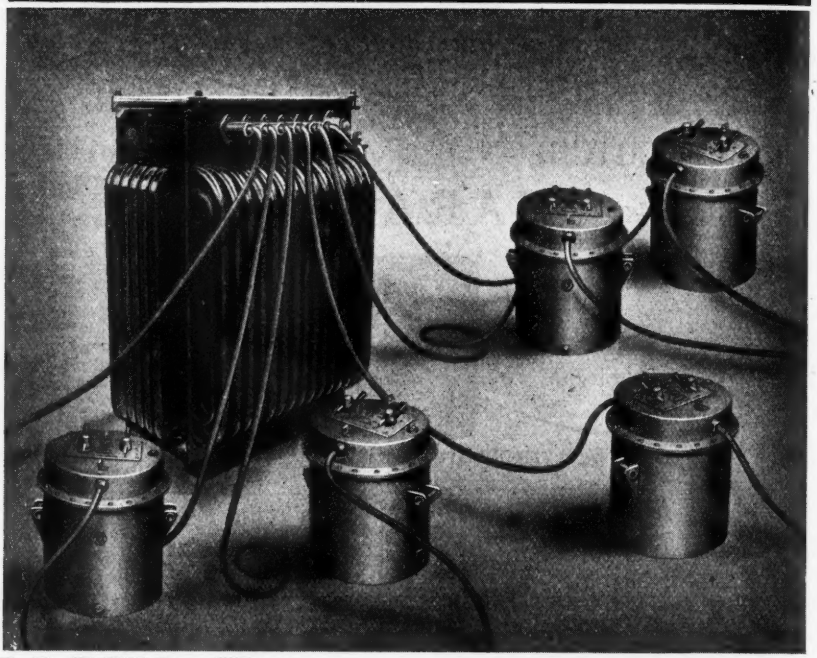
Makers of all types of repetition products from the bar in all metals.

M.C.L. and REPETITION LTD.

POOL LANE, LANGLEY, BIRMINGHAM

A

MAN-HOURS X WELDING = INCREASED PRODUCTION



WELD To increase OUTPUT

With METROVICK WELDING EQUIPMENTS

These equipments will help you to increase your rate of production. They are designed for 3, 6, 9 or 12 operators at 300 amps., or for 3 or 6 operators at 600 amps. each.

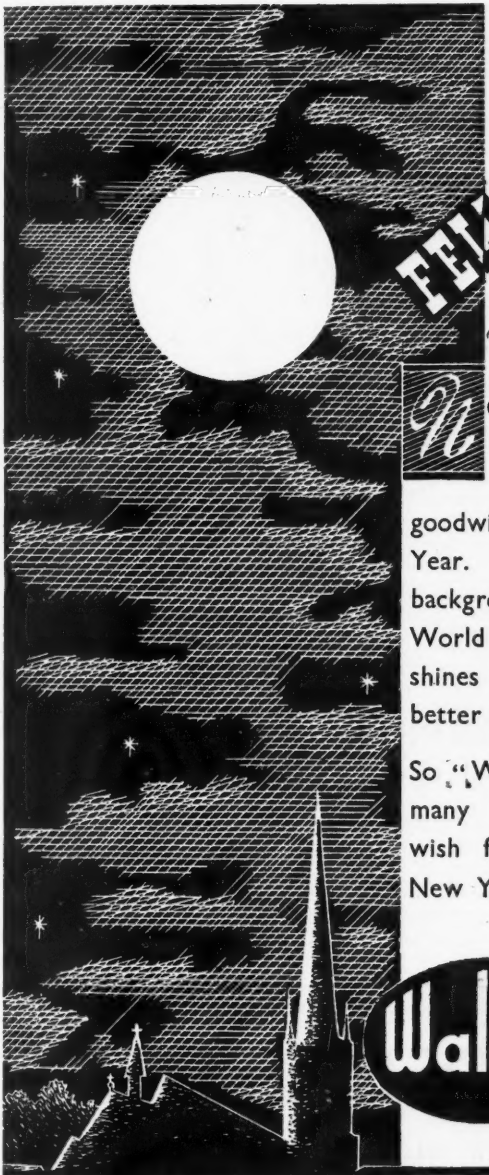
The illustration shows the Multi Operator A.C. equipment for six operators.

Send for further particulars on this subject

METROPOLITAN-VICKERS ELECTRICAL CO., LTD.

TRAFFORD PARK, MANCHESTER, 17

J/E203



FELLOWSHIP

NO power can ever ration the good wishes exchanged by all men of goodwill at this Season of the Year. 'Gainst the sombre background of the present World Tragedy—such goodwill shines brightly as promise of better things to come.

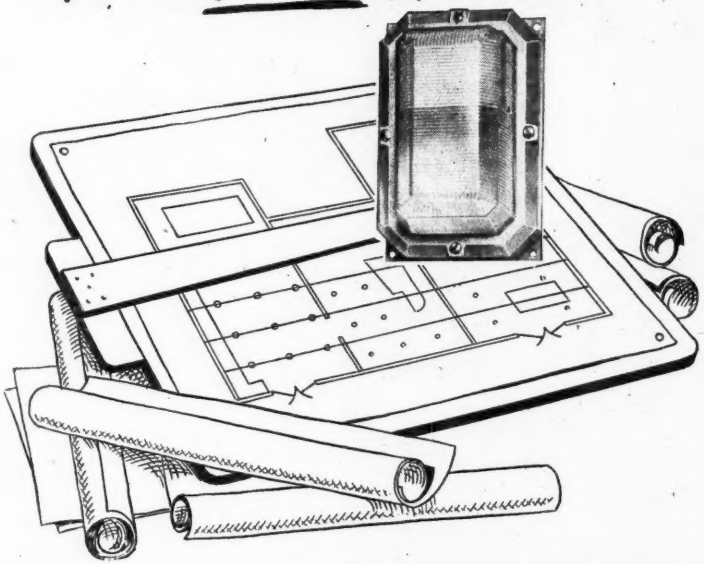
So "Walsall" wishes all its many friends the old, old wish for Christmas and the New Year.

Walsall

WALSALL CONDUITS LTD·WEST BROMWICH·STAFFS

A°

"Engineering Application of an Engineering product"



HOLOPHANE WIDERLITE BULKHEAD UNITS

In these efficient bulkhead units the glass which controls the light is practically all round the lamp so that the maximum output of light is ensured and it is directed where it is most effective. Holophane Engineers are using these and other units in the design of all kinds of industrial lighting installations. There is an engineer resident in your district ready to help you with any lighting problem.

HOLOPHANE

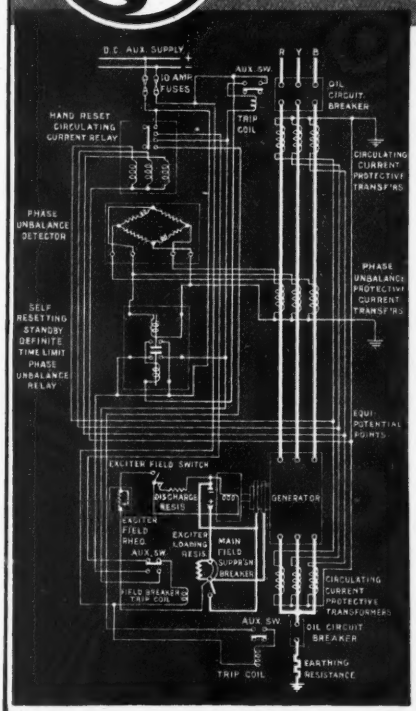
LIMITED.

ELVERTON STREET, LONDON, S.W.I.

Telephone : VICtoria 8062 (4 lines)

B T-H

PROTECTIVE GEAR



FOR THREE-PHASE A.C. GENERATORS

CIRCULATING CURRENT AND PHASE-UNBALANCE PROTECTION WITH AUTOMATIC FIELD SUPPRESSION

- High speed tripping for internal phase and earth faults in Generators.
- Maximum stability against asymmetrical through-fault currents.
- Protection of Rotor against heating due to sustained external unbalance faults to earth, or between phases.
- Relay of simple and robust construction (attracted-armature type)

The BTH Company manufactures a complete range of Protective Gear for all essential points of an A.C. System

BTH

THE BRITISH THOMSON-HOUSTON CO., LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

A 2773

"ENFIELD" CABLES

WE ARE SPECIALISTS IN THE CONSTRUCTION OF THE FOLLOWING :

- PAPER INSULATED LEAD SHEATHED CABLES
- RUBBER WIRES AND CABLES
- BRAIDED AERIAL CABLES
- TELEGRAPH AND TELEPHONE CABLES
- VARNISHED CAMBRIC CABLES
- COTTON COVERED WIRES
- BARE HARD DRAWN COPPER WIRE AND STRAND
- ALL KINDS OF FLEXIBLE CORDS
- SPECIAL CABLES TO GOVERNMENT SPECIFICATIONS

THE ENFIELD CABLE WORKS LTD.

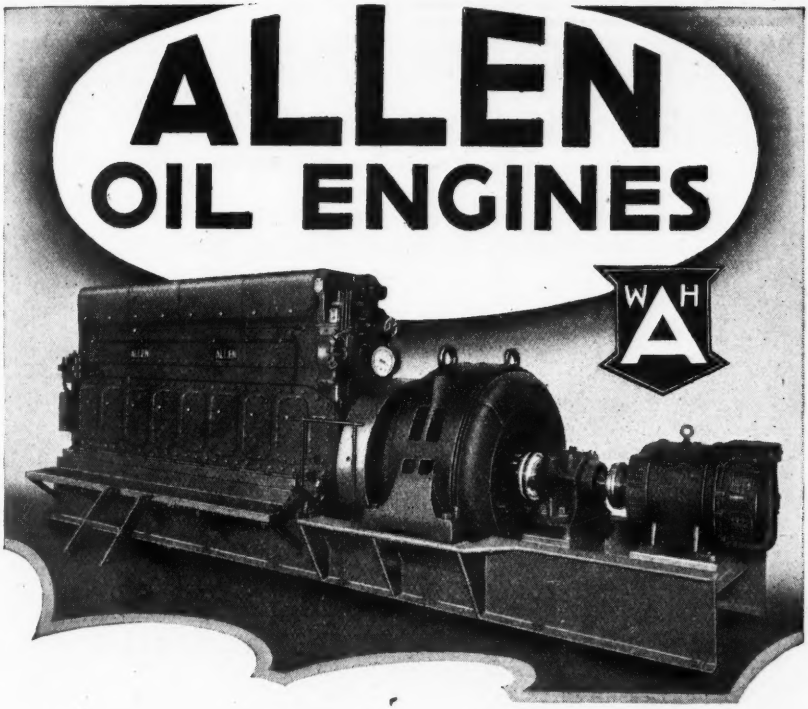
VICTORIA HOUSE, SOUTHAMPTON ROW

LONDON, W.C.1

Telegrams : ENFELCAMA, PHONE, LONDON. **Telephone : HOLBORN 0591 (4 lines)**

Branches : BIRMINGHAM BURTON-ON-TRENT GLASGOW MANCHESTER
BRIGHTON CARDIFF LEEDS STOCKTON-ON-TEES

ALLEN
OIL ENGINES



UNINTERRUPTED POWER SUPPLY

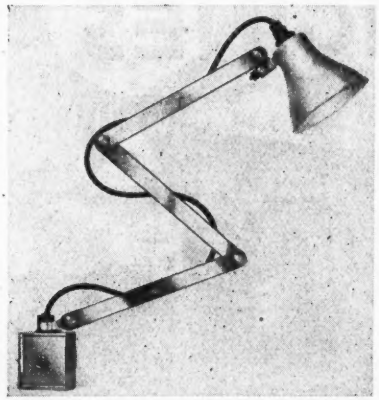
IN all cases where the continuity of electric supply is vital to the work being carried out, automatic-starting standby plant is essential. The illustration above shows a 250-kW generating set which can be arranged to provide an alternative power supply automatically.

The system of automatic starting employed on Allen oil engines does not rely upon an independent electric supply for its operation.

Allen type S.30-B engines are providing reliable power in practically every branch of industry and public service in many parts of the world.

W. H. ALLEN, SONS & CO., LTD., BEDFORD, ENGLAND

MAXIMUM OUTPUT
DEPENDS ON
EFFICIENT LIGHTING



D & G GIRDER FITTINGS
FOR MACHINE TOOL AND BENCH LIGHTING

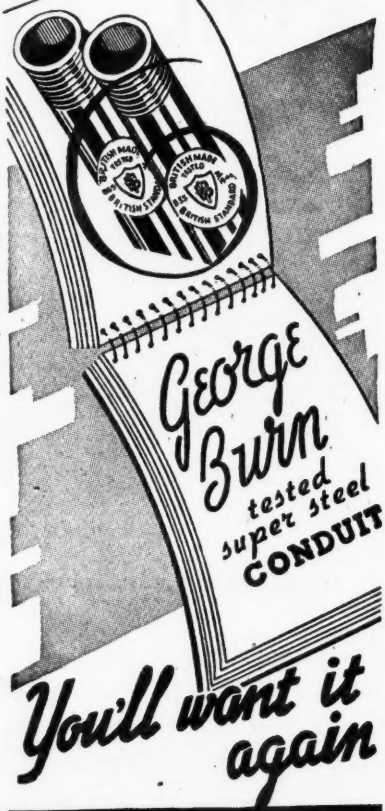
- Universal movement
- Concentration of light on the job
- Protects operators' eyes from glare
- Lower consumption
- Less lamp breakages

Made in Single-, Two- and Three-arm Extensions

Adopted by many of the Armament and other War Production firms

DRAKE & GORHAM WHOLESALE LTD.
77 LONG ACRE, LONDON, W.C.2
Telephone : TEMple Bar 3993
MANCHESTER : 29 Piccadilly. BRIGHTON : 24 Marlborough Place. GLASGOW : 182 St. Vincent Street. BRISTOL : 35 Broad Street. DUBLIN : 2 Church Lane, College Green
Midland Representative :
W. T. BOWER, 184 Jockey Road, Sutton Coldfield

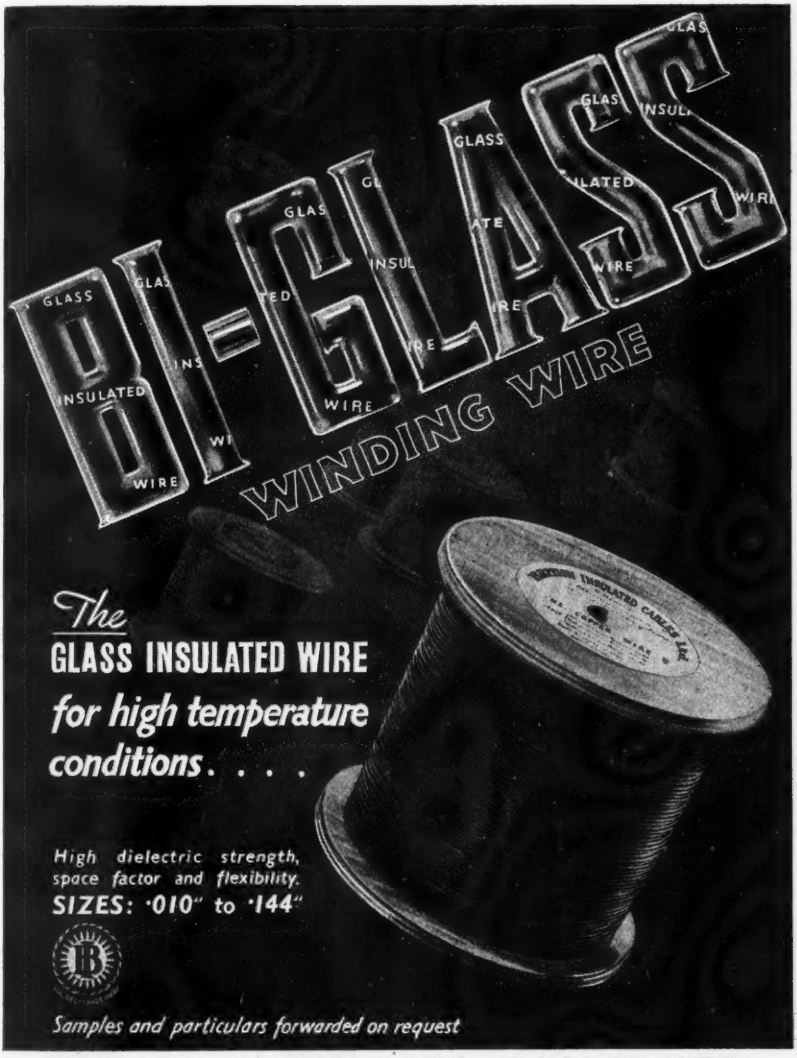
Remember the name



You'll want it again

George BURN Ltd.
CITY TUBE AND CONDUIT MILLS
SMETHWICK, BIRMINGHAM
Telephone Smethwick 1511 (5 lines)
London: 70 Finsbury Pavement, E.C.2
Liverpool: Caledonian Buildings, 14 Tithebarn St.

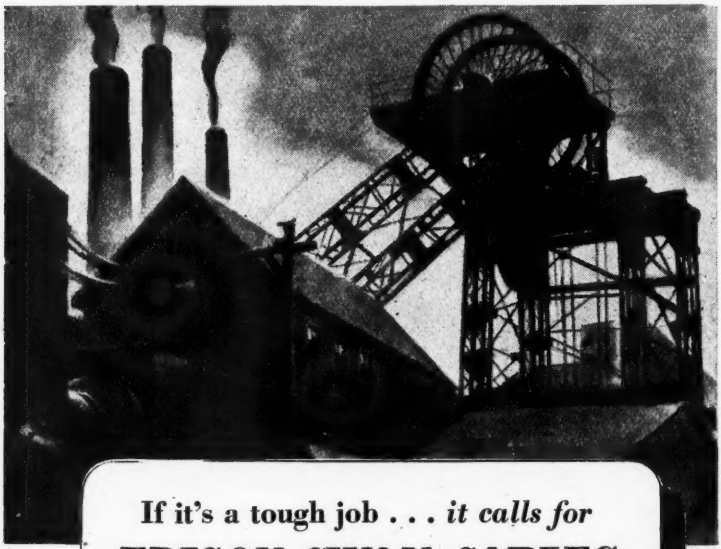
dm785



BRITISH INSULATED CABLES LTD
Head Office: PRESCOT • LANCS. Tel. No., PRESCOT 6571

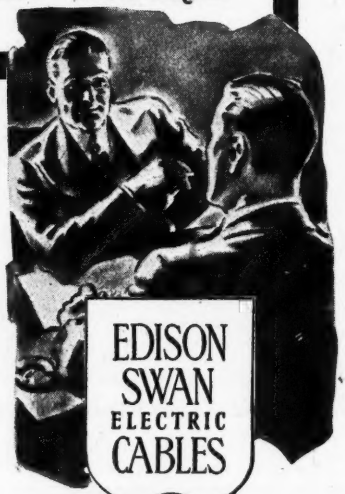
B.I. CALENDAR A nominal charge of 3d. per copy is being made for the B.I. CALENDAR this year. Early application, together with remittance, is desirable

EDISON SWAN CABLES IN INDUSTRY. No. 1. The Colliery Engineer.



If it's a tough job . . . *it calls for*

EDISON SWAN CABLES



Life lines of a mighty industry . . . at the pit-heads and down among the rich seams, hundreds of miles of Edison Swan Cables are daily proving their worth. Under the most arduous conditions they continue to carry the current.

Many thousands of miles of Edison Swan Cables have been supplied to the British Admiralty, War Office, Air Ministry, Municipalities, Supply Authorities, Railway Companies, Collieries, and for all industrial plants, etc.

EDISON SWAN CABLES LTD
155 Charing Cross Road, London, W.C.2

60 YEARS OF PROGRESS

THE evolution from the small London workshop of 1882 to the vast Ferranti plants of to-day is a story which synchronizes with the entire history of commercial electrical development.

The personal inspiration and inventive genius of Dr. Ferranti during the first forty-eight years of this period has created a tradition of restless progress which remains a vital urge to new electrical achievements in the service of the human race.

FERRANTI

METERS + TRANSFORMERS

INSTRUMENTS + FIRES

CLOCKS ETC.

FERRANTI LTD. HOLLINWOOD, LANCASHIRE

London Office, Bush House, Aldwych, W.C.2. FG67

METAL-CLAD

POWER-FUSE DISTRIBUTION-BOXES

INDIVIDUAL MANUFACTURE YET QUICK DELIVERY

UP TO 600 AMPERES
UP TO 660 VOLTS

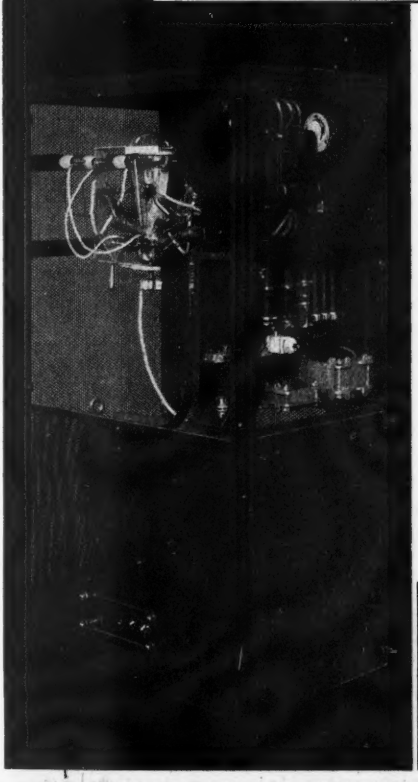
WITH ASTA TEST-CERTIFICATES
WITH OR WITHOUT MAIN SWITCHES
SEMI-ENCLOSED FUSES FOR ORDINARY DUTY
CARTRIDGE-FUSES FOR HEAVY DUTY

War-time power-distribution problems must be quickly solved, and they are not always easy. The Reyrolle solution lies in the quick manufacture of distribution-boxes designed to meet any individual requirements

REYROLLE
HEBBURN-ON-TYNE ENGLAND

CRYPTON

BATTERY CHARGERS



Prominent in the range of "Crypton" Battery Chargers is the "Crypton" Mercury Arc Rectifier for Battery Charging. This equipment offers many advantages for heavier charging rates, including high efficiency and complete reliability.

Full particulars of "Crypton" Mercury Arc Rectifier Battery Chargers and all other types of "Crypton" Charging Equipment are available and will be sent upon request.

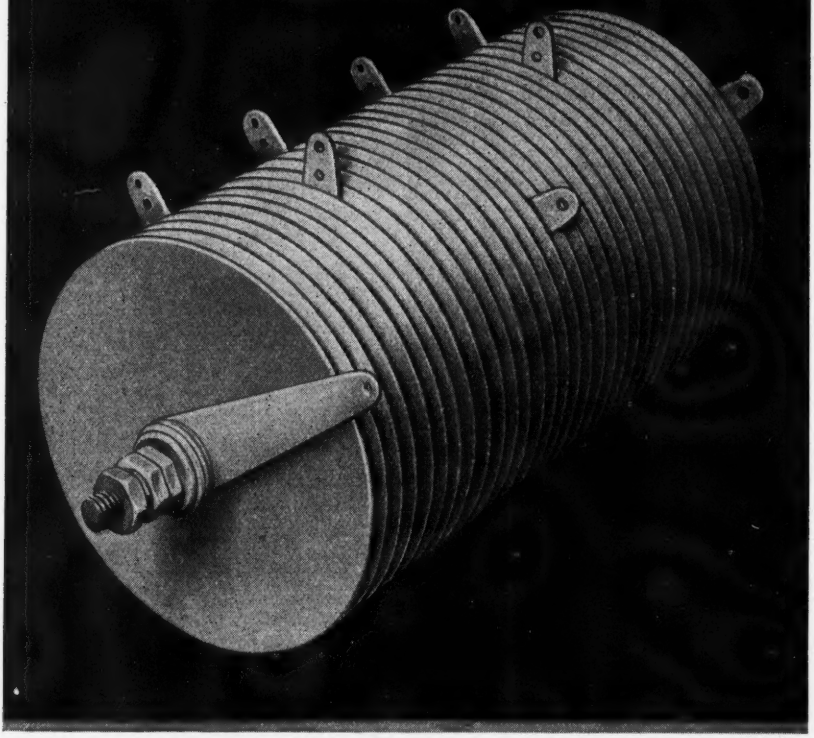
STATIC RECTIFIERS
CONSTANT POTENTIAL CHARGERS
MOTOR GENERATORS
CHARGING SWITCHBOARDS
ENGINE DRIVEN CHARGERS

CRYPTON EQUIPMENT LTD • REGD. OFFICE • GEORGE STREET • BRIDGWATER • SOM.

Associated Companies: Lancashire Dynamo & Crypto Ltd., Foster Transformers & Switchgear Ltd.

STC

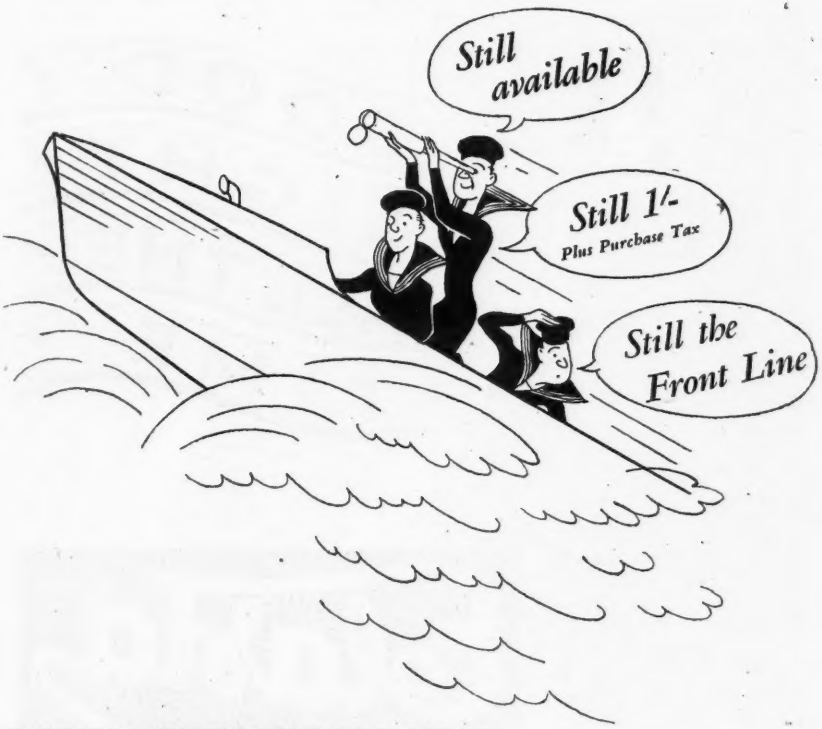
Selenium Rectifiers



THE BEST IN SERVICE

Standard Telephones and Cables Limited

NEW SOUTHGATE, LONDON, N.11



THEY'RE CERTAINLY MOVING!

There is nothing slow about the sales of Kye. You can sell as many as you can get—the only trouble is you can't get quite as many as you would like. The quantity available for household use is behind the demand. Can you wonder? Kye is the original British shilling lamp that in peacetime sold by the million because it was so reliable. It is still as reliable as ever, still 1/- (plus purchase tax, of course) and you can still have display material to tie-up with the advertising.

For profit and goodwill carry KYE lamps.

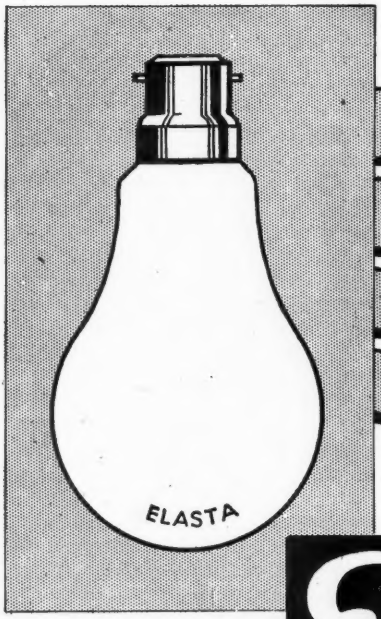
*

Made by CROMPTON PARKINSON LIMITED, ELECTRA HOUSE, VICTORIA EMBANKMENT, LONDON, W.C.2.
TEMple Bar 5911. *"Crompark, Estrand, London."*

FOR PROFIT AND GOODWILL CARRY

KYE

LAMPS



GOOD LIGHT ALL THE TIME

GOOD LIGHT ALL THE TIME because of the care in manufacture, and the quality of materials used. There is nothing "cheap" in ELASTA Lamps.

Elasta

ELECTRIC LAMPS

E.L.M.A. LAMPS MADE IN ENGLAND

POPE'S ELECTRIC LAMP CO., LTD.

5, EARNSHAW STREET, NEW OXFORD ST., LONDON, W.C.2

Telephone : TEMple Bar 6074. *Telegrams :* "Duramentum, Westcent, London."

Branches holding stocks from which supplies can be obtained :

MANCHESTER :
18 Pool St., Market Street.
Tel. : Deansgate 5687.
Grams :
"Pope's, Deansgate 5687."

LEEDS :
6 Park Square.
Tel. : Leeds 22119.
Grams :
"Pope's, Leeds 22119."

LEICESTER :
89 London Road.
Tel. : Leicester 59028.
Grams :
"Pope's, Leicester 59028."

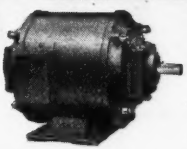
BIRMINGHAM : 3 Grosvenor Chambers, Broad St. Corner, Broad Street.
Tel. : Midland 2580.
Grams : "Pope's, Midland 2580, *Birmingham."*

LIVERPOOL :
Mr. B. Marks,
29 Lascelles Road
Liverpool 19

BRISTOL :
123 Victoria Street.
Tel. : Bristol 23239.
Grams : "Pope's, Bristol 23239."

BELFAST (Managers : Campbell, Gardner & Co.) : 27 Franklin Street.
Tel. : Belfast 25171 *Grams : "Camergard, Belfast."*

'ENGLISH ELECTRIC'
Fractional H.P. MOTORS



The searchlights of experience have proved the quality of
'ENGLISH ELECTRIC'
FRACTIONAL
HORSE-POWER
MOTORS

THE ENGLISH ELECTRIC Co. Ltd. STAFFORD

when he fitted

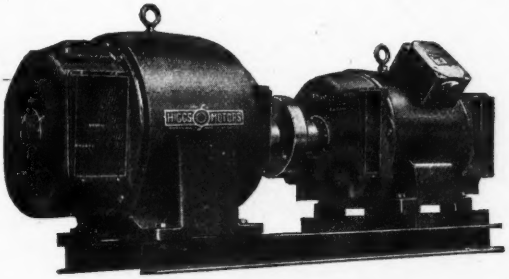
ATLAS LAMPS

He knew they'd give hours and hours of brilliant life. Atlas Lamps go through the severest tests at the factory—as exacting now as in peace time. Many of the largest users who keep accurate tests of lamp performance buy more Atlas Lamps than any other single make. And another point worth remembering these days is that you make more profit by selling Atlas. Ask for our terms.

THORN ELECTRICAL INDUSTRIES LTD., ATLAS LAMPS DIVISION, 105-109, JUDD STREET, LONDON, W.C.1.
Telephone: Euston 1183 (7 lines). Telegrams: "Eleclampo, Kincross, London."

Northern Branch: 55 Blossom St., Manchester. 'Phone: Central 7461-2-3. 'Grams: "Eleclampo, Manchester."
North Eastern Depot: 46 Sandhill, Newcastle-on-Tyne 1. 'Phone: Newcastle 24068-9. 'Grams: "Macu, Newcastle-on-Tyne."
Scottish Depot: 200 St. Vincent Street, Glasgow. 'Phone: Central 4015 (Pte. Branch Ex.) 'Grams: "Calyou, Glasgow."

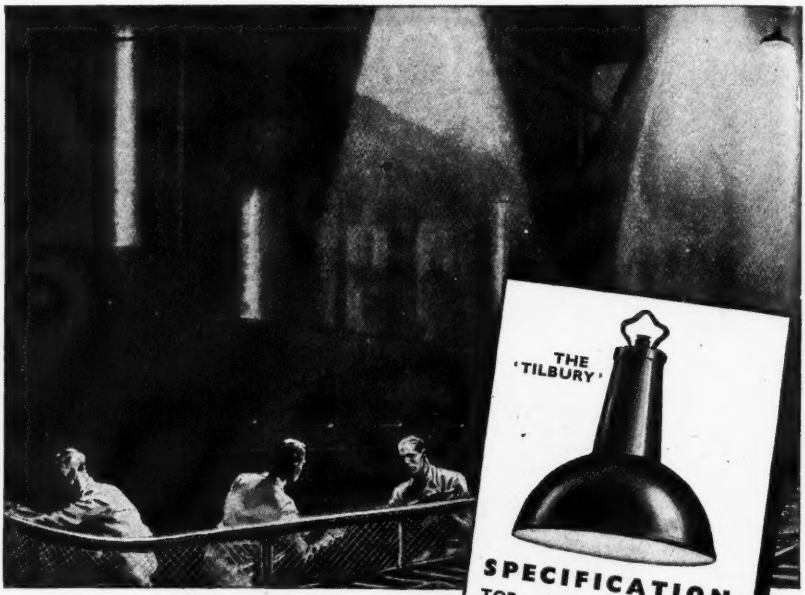
TRADE MARK
HIGGS MOTORS
GOVERNING DIRECTOR WALTER F. HIGGS, M.I.E.E. LTD.
BIRMINGHAM, 6 ENGLAND



POWER AND PURPOSE

Here is the set that makes the Power that drives the machines that turn out the "tools" that give our Forces the means to attain the Glory of wrecking the house that Adolf built.

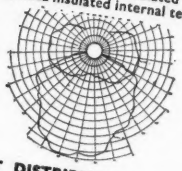
Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Nottingham, Peterborough, Sheffield, Wolverhampton.



THE 'TILBURY'

SPECIFICATION:

TOP—Cast Iron. **REFLECTOR**—Heavy gauge sheet steel. **HOLDER**—Porcelain Home Office pattern carried on double anti-vibrator discs. **WIRE GUARD**—Galvanised fixed with three cast brass eye bolts and clips. **SUSPENSION**—Loop ⅛" dia. mild steel. **CABLE ENTRY**—Insulated Packing gland, mica insulated internal terminals.



LIGHT DISTRIBUTION CURVE

YOUR LAMPS — INSULATED AGAINST VIBRATION

The "Tilbury" fitting is a vitreous-enamelled reflector designed for use wherever a lighting point is subjected to severe vibration and where high mounting heights are necessary. Robustly constructed (the lamp being effectively protected by its anti-vibrator discs) this practical fitting affords maximum protection against premature lamp failures. Many thousands of these fittings are successfully in use in the largest iron and steel plants in the country.

FACTORIES (STANDARDS OF LIGHTING) REGULATIONS 1941

ARE YOUR LIGHTS RIGHT?

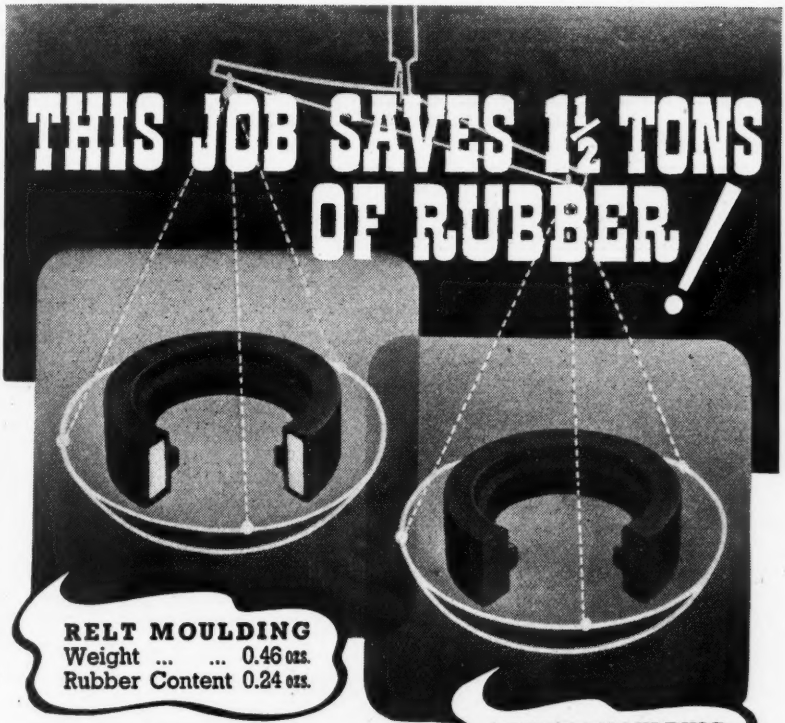
CONSULT AN ELECO INDUSTRIAL LIGHTING EXPERT

ENGINEERING & LIGHTING EQUIPMENT Co LTD

DEPT. W.S., SPHERE WORKS, ST. ALBANS, HERTS.

PHONE: ST. ALBANS 2258 · 2259

THIS JOB SAVES 1½ TONS OF RUBBER!



RELT MOULDING
Weight ... ... 0.46 ozs.
Rubber Content 0.24 ozs.

RUBBER MOULDING
Weight ... ... 1.20 ozs.
Rubber Content 0.80 ozs.

On a production run of 100,000 of these mouldings, 1½ tons of rubber was saved. This is typical of dozens of similar jobs now produced by the RELT process. The weight saving of over 60% is also typical and carries outstanding implications in some of our leading industries to-day.

RELT
(REGISTRATION APPLIED FOR)

IS AN ANSWER TO THE RUBBER SHORTAGE

SEND YOUR ENQUIRIES FOR "RELT" MOULDINGS TO EMPIRE RUBBER CO., BUT MAKE SURE TO TELL US JUST WHAT YOUR COMPONENT HAS TO DO.

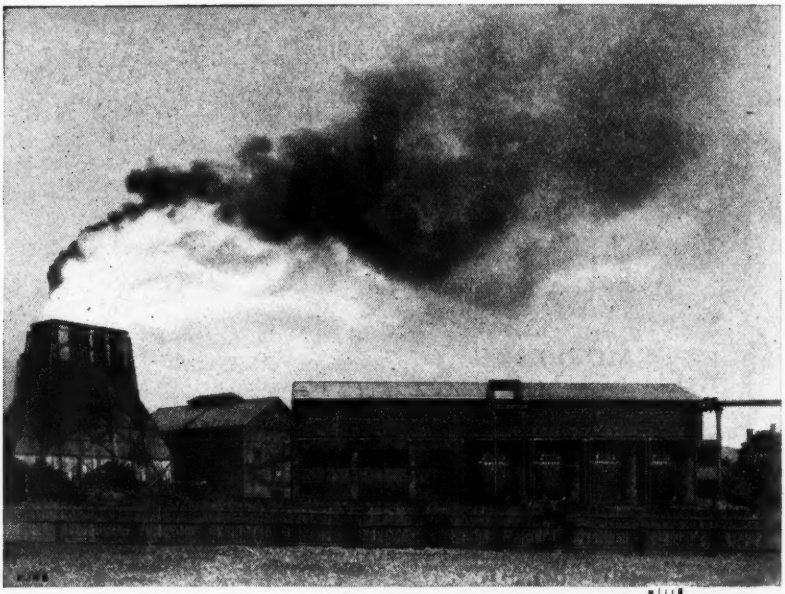
Our Complete Technical Service is at Your Disposal

EMPIRE RUBBER CO.
DUNSTABLE - BEDFORDSHIRE
Phone DUNSTABLE 533 - Grams SPANDIT, DUNSTABLE

BURY FELT MFG. CO. LTD.
HUDCAR MILLS - BURY - LANCS
Phone: BURY 876

BRUSH

TRANSFORMERS



ABOVE AND BELOW GROUND

THE Mining Industry is continuously at work to cope with the unprecedented demand for coal and metal to meet the requirements of our vast national effort.

Above and below ground, "BRUSH" Transformers are playing their part in maintaining the correct power supply for all industries.

Transformers for Mining Installations need special features of design and construction, and "BRUSH" Mining Type cover these requirements.

The illustration shows part of a bank of "BRUSH" Transformers installed by a well-known Colliery Company.

THE BRUSH ELECTRICAL ENGINEERING CO LTD LOUGHBOROUGH ENGLAND

5,58

Because PREMIER is, for obvious reasons, severely restricted in the production of its own Fine-Quality, it presents some little gems of fine quality from the books of our day

"It'll do!"

My work in the theatre has taught me many lessons, but the most important is that only the best is good enough.

We all choose for ourselves certain rules of life, though we do not always keep them. We are all human, and often fail to reach the standards at which we aim. But the important thing is to aim high. I have always found that my most successful productions have been those with which I have aimed highest and taken most trouble. My failures have mostly been those of which I could not honestly say that they satisfied me.

The worst fault in the theatre is the tendency to slacken off just when one's most strenuous efforts are needed to ensure a satisfactory finish. "It'll do" is an evil phrase, far too common. It is a poisonous drug, and responsible for all the faulty work done in the home, the shop, the factory and the theatre.

From "COCK-A-DOODLE-DO" by Charles B. Cochran. (Reproduced by kind permission of the publishers, J. M. Dent & Sons Ltd.)

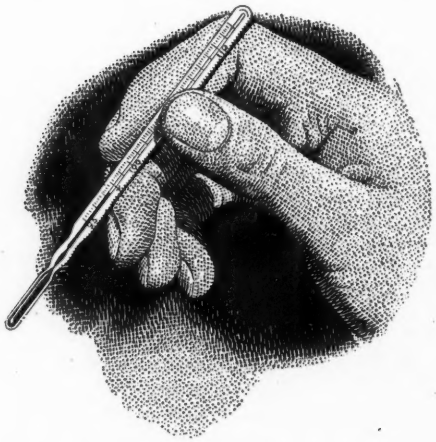
PREMIER *Fine-Quality*

electric heating appliances, including the famous "Laundwell" and "Smoothwell" electric irons; "Quickset" and "Pylon" electric kettles; electric fires; toasters; coffee percolators; multi-boilers, glue-pots and other appliances.

PREMIER ELECTRIC HEATERS LIMITED · BIRMINGHAM, 9

COPPER PROBLEMS

too—have recognisable symptoms



The C.D.A. know most of them

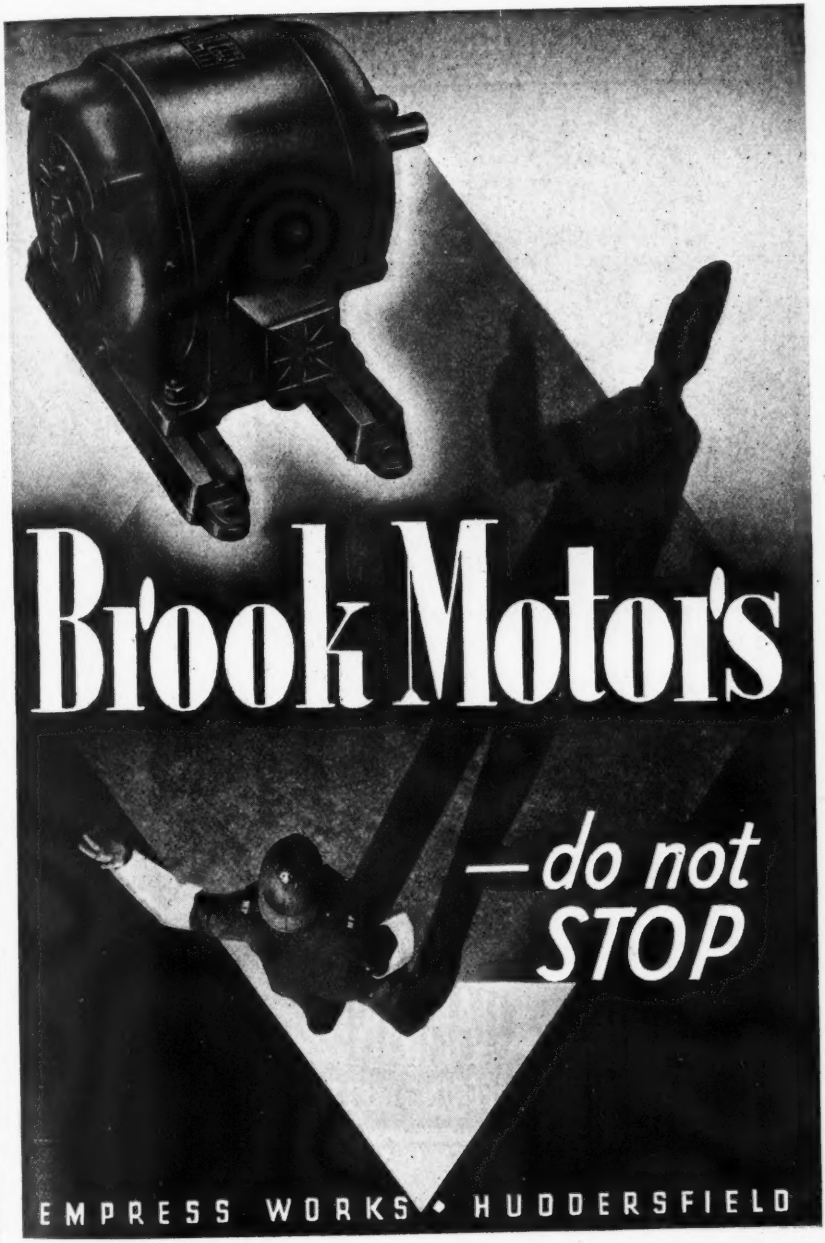
Some problems connected with copper can be very elusive. They may baffle expert technicians—or they may be solved with unexpected speed, through being viewed from a new angle. In this, the Copper Development Association can render a valuable service. Their wide experience in the uses of copper and of its behaviour under almost every condition greatly assists in the diagnosis of problems and in finding effective solutions. The Association offers this advisory service freely to all users of copper or copper alloys.

COPPER DEVELOPMENT ASSOCIATION

A non-trading organization maintained by the British Copper Industry to supply information and advice, free, to all users of copper

Grand Buildings, Trafalgar Sq., London, W.C.2 and 9 Bilton Road, Rugby

C.11


Brook Motors
—do not STOP
EMPRESS WORKS • HUDDERSFIELD

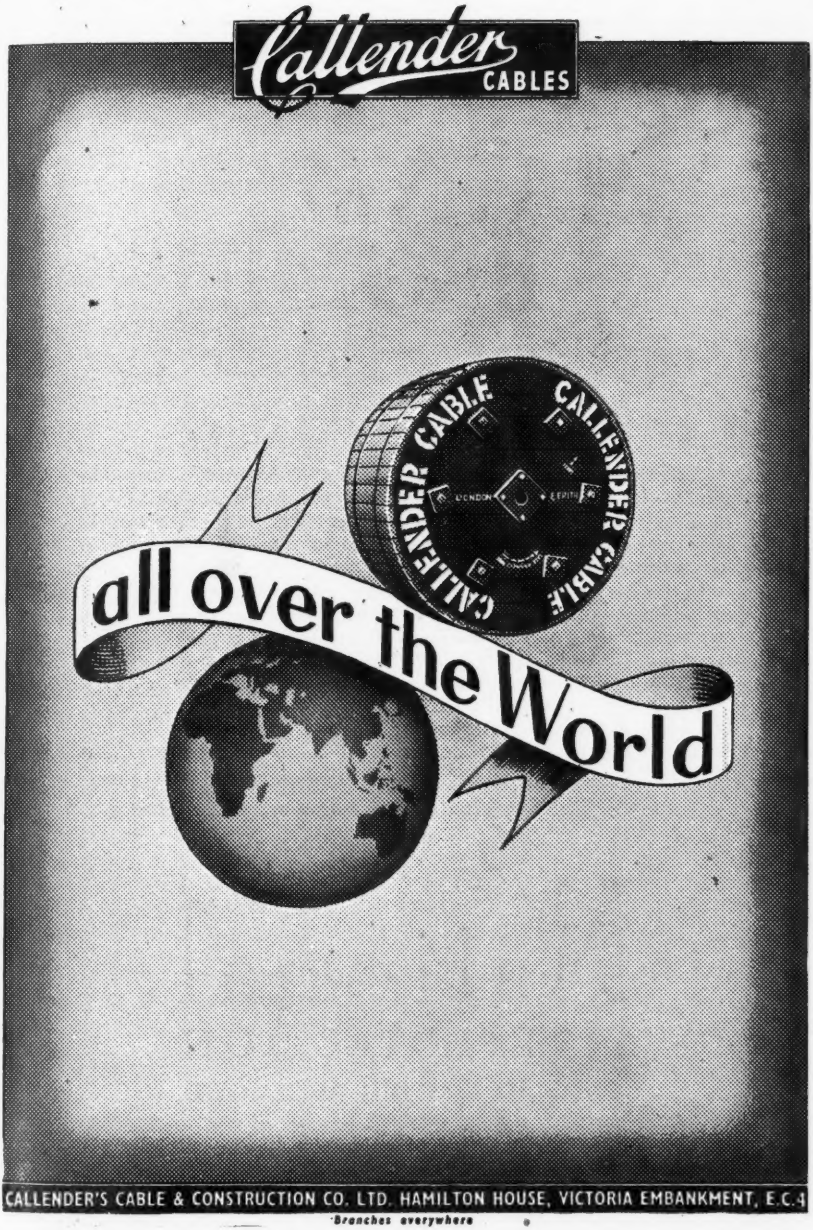
WOMEN *and* WAR

MACHINING
and
still
MACHINING

Slender threads by dexterous fingers fashioned: that was 1939. In 1942, amidst the hum and roar of modern plant, these same fingers work in different mood. Metal strips replace the threads and a strong will with long hours contribute towards the Effort. So proceeds Miss May Aitchison with her daily task.

HARLAND

THE HARLAND ENGINEERING CO. LTD. ALLOA, SCOTLAND


Callender CABLES
CALLENDER CABLE
CALLENDER'S CABLE
all over the World
CALLENDER'S CABLE & CONSTRUCTION CO. LTD. HAMILTON HOUSE, VICTORIA EMBANKMENT, E.C.4
Branches everywhere

Essex

METHYL BROMIDE

convincing endorsement from a satisfied user...

"... in connection with the outbreak of fire which occurred at our Works when Oil Cooling Tanks containing 800-gallons of oil caught alight, we would explain that the *Fire Extinguishers were not brought into use by our Fire Fighters on these Tanks until 8-minutes after the actual commencement of the fire*, and by that time the flames from the tanks seemed *almost uncontrollable*, but immediately on bringing the Extinguishers into use the flames began subsiding and *within 10-seconds effectively quenched the fire* from the Tanks completely. We are glad to say the Department was able to resume work within 3-hours of the outbreak. ....
... Our experience with your Methyl Bromide Extinguishers has proved them most efficient, *safe* and reliable and we feel sure that any firm purchasing one of these for their premises will find them most satisfactory and of excellent performance."

The name and locality where the above incident occurred are omitted for security reasons.

The National

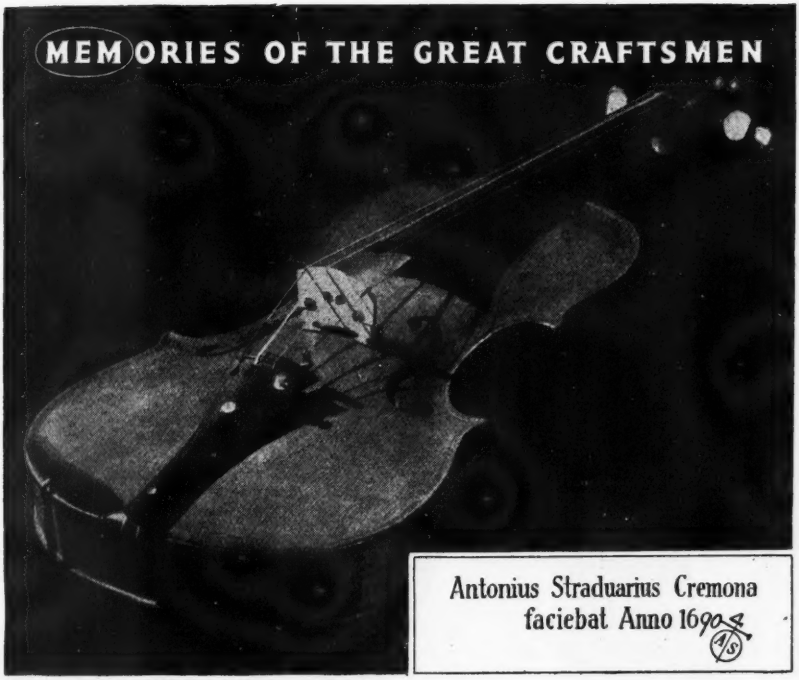
FIRE PROTECTION

COMPANY LIMITED RICHMOND

Fire Protection Engineers and Consultants

TEL.: RICHMOND 2342 - 3 - 4

MEMORIES OF THE GREAT CRAFTSMEN



Antonius Straduarius Cremona
faciebat Anno 1690 A/S

CRAFTSMANSHIP means making things just as well as one knows how. Antonio Stradivarius was a maker of violins in Cremona nearly three hundred years ago. He and his sons made the finest fiddles that had ever been seen or heard. They made them one at a time, with loving skill. But then there were comparatively few people who wanted to buy fine fiddles.

Nowadays thousands of people want to enjoy those refinements of living—like Light, Heat and Power offered by Electricity. The problem M.E.M. engineers had to solve was how to supply the needed electrical equipment in large quantities without sacrificing the quality and workmanship which are the essence of true craftsmanship. They did it by the use of scientific mechanisation planned to give the greatest possible aid to the skilled workers.

Just at present, of course, even the great M.E.M. factory cannot give the prompt deliveries its customers have always expected and received. But the day will come when M.E.M. will be able to swing back to normal production. Meantime the New Craftsmanship lives and grows ever nearer to perfection.

MIDLAND ELECTRIC MANUFACTURING CO., LTD., TYSELEY, BIRMINGHAM, 11

London Showrooms and Stores:
21-22, Rathbone Place, London, W.1.

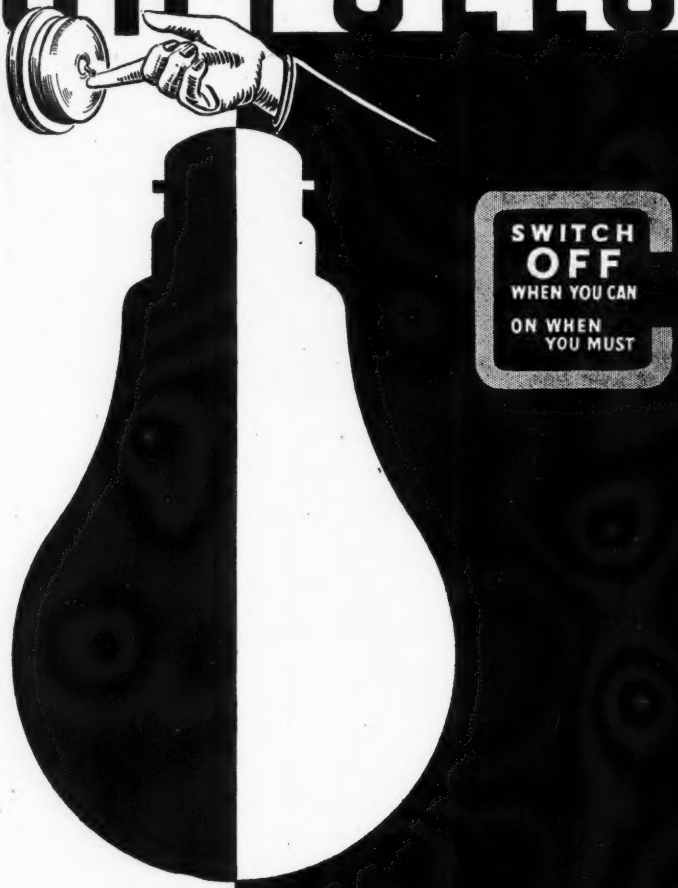
Specialists in Switch, Fuse and Motor Control Gear.

MEM

Manchester Showrooms and Stores:
48-50, Chapel Street, Salford, 3.

Manufacturers of High Efficiency Electric Fires.

CRYSELCO



"Current" "Saving Bonds". Buy them!

• CRYSELCO • LIMITED • BEDFORD •

Short-Circuit Tested

J. & P. Type S.F. AIR BREAK Switchgear

incorporating EETEE/J.P Fuses with tripping device tested by A.S.T.A.

May we send you copies of these brochures ?

JOHNSON & PHILLIPS LTD.

CHARLTON, LONDON, S.E.7

Telephone : Greenwich 3244 (13 lines). *Telegrams* : "Juno," Charlton, Kent

The mark that means that "little more" in quality

NEVILLE'S

COIL WINDING MACHINES

TAPING MACHINES

WIRE COVERING MACHINES

ARMATURE AND STATOR

COIL WINDERS

Contractors to the Admiralty and other Government Departments

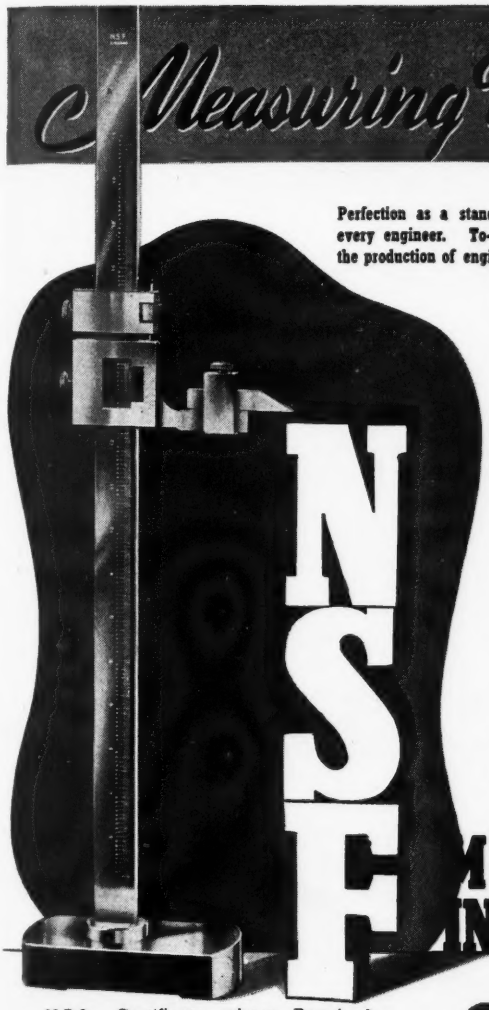
NEVILLE'S (LIVERPOOL) LIMITED

SIMMONDS TOWER · GREAT WEST ROAD · LONDON

Please address all enquiries to Western Office:
City House, St. Stephen Street, Bristol, 1.

A DIVISION OF THE SIMMONDS GROUP

Measuring Perfection



Perfection as a standard of achievement is the aim of every engineer. To-day as never before, perfection in the production of engineering equipment is a vital necessity It is a standard which if consistently sought will shape the events of to-morrow.

Just as the Spitfires and Hurricanes which cleared our skies of Hitler's hordes were the result of the designers' and manufacturers' efforts to secure perfection, so have the most important achievements in engineering throughout the ages been backed by similar ideals.

In the production of our Height Gauges and Calipers we aim at the highest standard.

We are measuring up to the ideal . . . . . Perfection.

PRESENT MANUFACTURING RANGE

10" HEIGHT GAUGE - ENGLISH OR METRIC SCALE
18" HEIGHT GAUGE . . . ENGLISH SCALE
VERNIER CALIPERS . . . . 9" ENGLISH or 25 cm. Metric Scale

N.S.F. MEASURING INSTRUMENTS

N.P.L. Certificate where Required

BRITISH N.S.F. CO., LTD.

All Enquiries to Our Agents

Southern Agents
STEDALL MACHINE TOOL CO.
147-155, St. John Street, London, E.C.1
Phone—CLERKENWELL 1010 (10 lines)

Northern Agents
MITCHELL FOX & CO., LTD.
89, Meadow Lane — Leeds, 11
Phone—23158-24019

B

Is this for you please?

INLAND TELEGRAM

ADDRESS

WINDING WIRE USERS EVERY TOWN

KINDLY RETURN IMMEDIATELY ALL EMPTY REELS DRUMS AND OTHER PACKING MATERIAL TO AVOID DELAYS IN DELIVERY

LEWCOS LONDON

Lewcos

INSULATED CONDUCTORS

for coils of all types

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED · CHURCH ROAD · LEYTON E.10

METHOD OF MOUNTING

Five patterns to select from:

1. Back terminal projecting pattern with back fixing.
2. Back terminal projecting pattern with front fixing.
3. Back terminal flush pattern.
4. Front terminal projecting pattern with front fixing.
5. Controller pattern. 6" ammeters and voltmeters only.

THIS new range of 4" and 6" round pattern instruments in pressed steel cases embodies the latest practice in instrument construction. The movements are spring controlled and are mounted on spring urged jewelled bearings. Each instrument has an individually calibrated and mechanically reproduced scale, the clearness and legibility of which are features of Evershed instruments. All the instruments comply with the requirements of British Standard Specification No. 89 for First Grade instruments and each carries a 12-months Guarantee. *For full particulars write for List D*

EVERSHED & VIGNOLES LTD., CHISWICK, LONDON, W.4

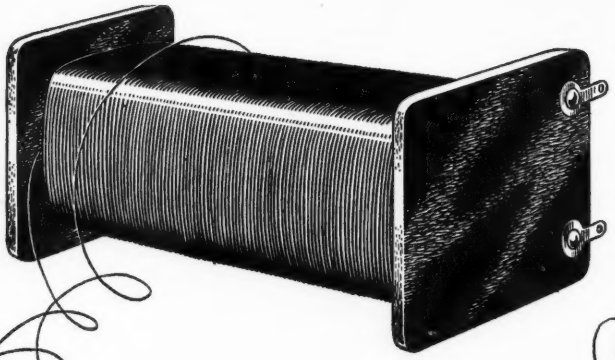
REGISTERED 'MEGGER' TRADE MARK

ELECTRICAL TESTING INSTRUMENTS

Insulation Testers, Resistance Testers, Earth Testers, Switchboard and Portable Indicating and Recording Instruments, Apparatus for Remote Indication and Control, etc.

TELEPHONE CHISWICK 1370 TELEGRAMS MEGGER, CHISK, LONDON

5-33A



BAKELITE VARNISH

V11105

—the latest phenolic stoving varnish for insulated wires can be safely used with enamelled wire, cellulose acetate, silk, cotton, 'Nylon', 'Viscose' and 'Formvar'. Write for samples and detailed information to Bakelite Limited, 18 Grosvenor Gardens, London, S.W.1. Telephone: Sloane 9911

TREFOIL

BAKELITE PLASTICS

REGD. TRADE MARKS

Pioneers in the Plastics World

T.12

ELECTRICAL REVIEW

Volume CXXXI — No. 3394

Friday, December 11, 1942

Contents

	Page		Page
Editorial—The Future of Industry	739	Education in Russia. By G. Mather, B.Sc.Tech., A.M.I.E.E.	759
Private Generation	741	Switchgear Installation	761
Hydro-Electric Economics	745	Electricity Supply	762
Institution Proceedings	747	Workmen's Compensation	763
Correspondence	751	Financial Section	764
Parliamentary News	754	New Patents	769
Personal and Social	755	Contract Information	770
Commerce and Industry	756		

Classified Advertisements . 61 — Index to Advertisers . 72

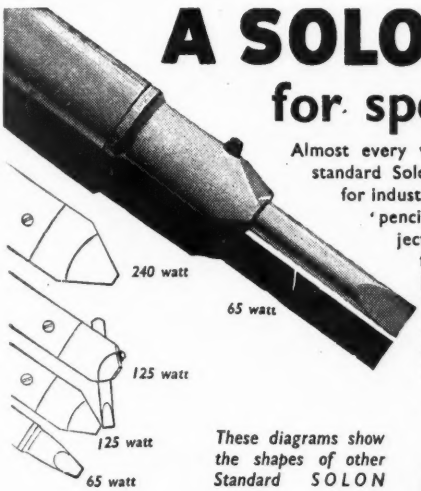
EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1.

Telegraphic Address: "Ageekay, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (35 lines). Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."

A SOLON MODEL
for specialised work



These diagrams show the shapes of other Standard SOLON models.

Almost every variety of work is covered by one of the standard Solon Electric Soldering Irons specially designed for industrial use. The illustration shows the 65-watt 'pencil' bit. All Solons for industrial use are subjected to a pressure test of 600 volts to earth for one minute. All connections safe from heat and corrosion in the bakelite terminal box. Complete with 6 feet of HENLEY 3-core flexible. Made for the following standard voltages: 100/110, 200/220, 230/250. *Full details on request.*

Made in England by
W. T. HENLEY'S TELEGRAPH WORKS Co. Ltd.
Engineering Department, Milton Court
WESTCOTT, DORKING, SURREY.

Supplies of these various models are only available for essential war work, of course, and due to heavy demands it is necessary to order well in advance to avoid disappointment in delivery.

SOLON
Electric
SOLDERING IRON FOR INDUSTRIAL USE

SWITCHES AND SWITCHBOARDS BY THE THOUSAND !

SINCE SEPT., 1939

LITERALLY THOUSANDS OF SWITCHES AND SWITCHBOARDS HAVE LEFT OUR WORKS TO FULFIL THEIR VARIOUS PURPOSES

Berry's ELECTRIC LTD.

85/86 NEWMAN ST., LONDON, W.1

ALSO BIRMINGHAM, MANCHESTER AND NEWCASTLE

FUEL SAVING—FOR THE STEAM-RAISER

May we send ***LEAFLET 751-X*** *?*

This portable outfit checks the efficiency of steam-raising by measuring the CO_2 percentage and the temperature in the flue gases, enabling the heat lost up the chimney to be determined. Steps can then be taken to reduce wastage and secure maximum efficiency.

CAMBRIDGE INSTRUMENT COMPANY LIMITED

13 GROSVENOR PLACE LONDON S.W.1

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXI. No. 3394. DECEMBER 11, 1942 6d. WEEKLY

The Future of Industry

Combines and Control

A WORD of warning seems to be necessary to those who advocate that the country's production should be placed entirely in the hands of large combines. The squeezing-out or absorption of small manufacturing companies would mean handing over perpetual rights to the large groups and the old system whereby progressive men could build up efficient undertakings beneficial to the community and remunerative to themselves would disappear.

Thus the whole of the industrial population would become the servants of the groups and if they had any voice at all would insist that these groups should be subject to rigorous State control. In this event where would there be any advantage in private ownership? Why not go the whole way and transfer all industry to the State?

Integration and Nationalisation

Those in favour of "integration" are among the first to oppose any suggestion of nationalisation. Let them pay full regard to the possibilities inherent in their policy and refrain from pursuing it to an inevitable end. While a great deal may be said for large manufacturing units, there is a point beyond which concentration cannot go if nationalisation or State-controlled corporations are to be avoided.

Nationalisation may possibly have advantages when applied to some services or commodities, but the electrical manufacturing industry is not a suitable subject for an experiment of this kind. Stabilisation might be secured in this way, but stabilisation can be synonymous with stagnation and it is doubtful whether under such conditions we would be able to recover and retain our export trade, however much the conditions might be applicable to the Home market.

Where the customer is allowed to choose there will be competition and continuous endeavour to provide improved products at reasonable prices. Where there is no choice there will be dull uniformity and little incentive to go out of the way to make improvements.

Size and Efficiency

But, it has been said, excessive competition is uneconomic. Manufacture on a small scale by a large number of separate units means high production and selling costs and consequently increased prices to the buyer. This seems to be an obvious truth, but like many others of its kind is only half true. As was pointed out in recent correspondence in this journal, size is not necessarily a certain indication of efficiency. There are inefficient combines, sustained by monopoly, and efficient small concerns, spurred on by competition.

Nobody wishes to see a repetition of the scramble which followed the last war and some measure of control will have to be retained or instituted. If, however, a concern is able to show that it is in a position to produce something which is needed, with a reasonable chance of success, it should be allowed to proceed. Control should be directed towards pre-

venting "wildcat" adventures and entry into fields already well served by existing manufacturers large or small. It should be exercised in consultation with representatives of all grades of industry and not in an arbitrary, independent fashion.

Water Power Possibilities

How circumstances have necessitated a revision of views on hydro-electric development was well brought out in a recent discussion at the Institution of Civil Engineers, reported in this issue. Two outstanding points are the enormously-increased cost of steam coal and the probability of the continuance of the cheap money policy after the war. The existence of the grid also tends to turn the balance in favour of water-power schemes involving long-distance transmission.

Fuel Saving

It might have been thought that slot-meter consumers, who "pay as they go," would have made the best response to appeals for economy. On the contrary, in London at least, they have actually been using more, according to Sir John Dalton, the Regional Fuel and Power Controller for London and South-East England, who has made an examination of 45,000 bills recently. Although on this account the overall saving by domestic consumers has not been so great as it should have been, there was a decrease in consumption of 7 per cent. in October as compared with the corresponding month of last year, which shows that the campaign has produced some results. Business premises did even better, the saving in their case amounting to 14 per cent.

Social Security

Sir William Beveridge's comprehensive plan for insuring the people against illness, disability and unemployment and for making provision for old age and family allowances has already received such publicity as to make it unnecessary for us to go into details. It will, of course, affect the electrical industry equally with all others. Very few will question the desirability of such plans for the future, but many will wonder what the effects may be in some directions. We have already heard it suggested that the scheme might tend to raise costs sufficiently to affect our competitive position abroad. It is by no means certain that it would; all that seems to be involved is a certain redistribution of the national income, a process which is already in operation. There would probably have to be stronger safeguards against shirking than that proposed by Sir William; given these, it should be a distinct advantage to industry to have a labour force freed from the worries which ordinarily beset them.

Maintenance Electricians

The need to discriminate between the qualifications of electrical men on the part of the public is not by any means confined to the higher ranks. In order to obtain the best results from electrical installations in industry, works managers should be able to distinguish between the qualifications of operatives for particular duties. Thus a wireman trained to carry out work of a constructional character is not necessarily fitted either by nature or by the right kind of technical knowledge and experience, to cope with problems of maintenance. Lack of appreciation of the difference between the two trades is likely to result in "square pegs in round holes."

Contractors' Showrooms

We have always contended that electrical contractors could not hope to meet supply authority competition in the sale of domestic appliances unless they possessed suitable showrooms and that generally these could only be established on a co-operative basis. The question was recently debated at a meeting of the Manchester branch of the E.C.A. and a committee was appointed to report on a scheme. At Plymouth, too, members have expressed the opinion that the subject was one which should be dealt with at a future meeting. Hire-purchase is also an important consideration in the domestic appliance business.

Industrial Diseases

At a recent E.P.E.A. meeting, according to the *Electrical Power Engineer* a section secretary read out a list of Association benefits. Referring to the Specialist Consultation Service, he said this dealt with asthma, bronchitis, baldness, nervous debility, etc., and concluded: "These are what you get by joining the Association." But it is probable that non-members are even more liable to these disorders.

Private Generation Scheme

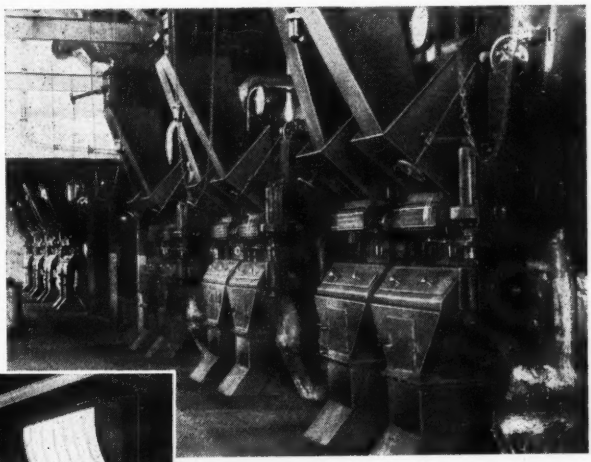
Electricity as a By-product in Meeting Factory Heating Demands

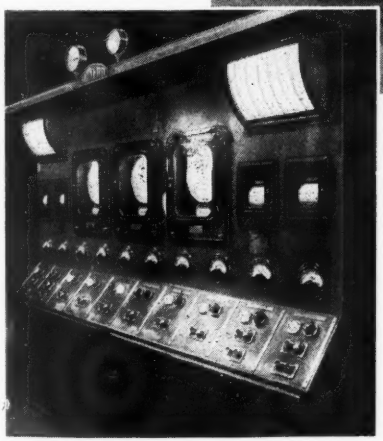
THIS article relates to a factory in which large quantities of steam are used for both heating and process plant, partly because the factory conditions are such that the use of other forms of heating would be undesirable and also because of the intricate nature of the layout and distribution scheme. Boiler plant has, therefore, been installed to meet these requirements.

Advantage has been taken of the opportunity to arrange for the economical production of electricity as a by-product of the heating and process steam demands. The private generation scheme runs in parallel with the public electricity supply, and the operating arrangements provide for electricity to be taken from the public undertaking to the extent of a complete stand-by supply and the possible "export" of surplus power from the factory generators, if required. A fine degree of balancing is required between public and private electricity and steam supplies. References to this balancing, however, will be better appreciated after a brief description of the boiler, private generation and bulk supply equipment.

The boiler and power (private generation) houses must be considered independently as interconnected components of a steam and electricity generation scheme, and not as one centrally situated generating plant, as in the case of accepted normal practice.

A typical boiler house is equipped with eight Lancashire boilers arranged for operation as two self-contained batteries of four boilers each. Each boiler has a normal output of 13,000 lb. per hour and the steam conditions are 250 lb. per sq. in. and 630 deg. F. It has a heating surface of 1,230 sq. ft. and is equipped with a Sugden detachable-tube superheater with a heating surface of 475 sq. ft. The boilers are served by Hodgkinson coking type stokers, each of which, with an area of 20 sq. ft., is designed to deal with 1,700 lb. of coal per hour. The stoker hoppers receive their coal from 15-ton overhead hoppers which are served by Bennis overhead-gantry coal-handling plant.





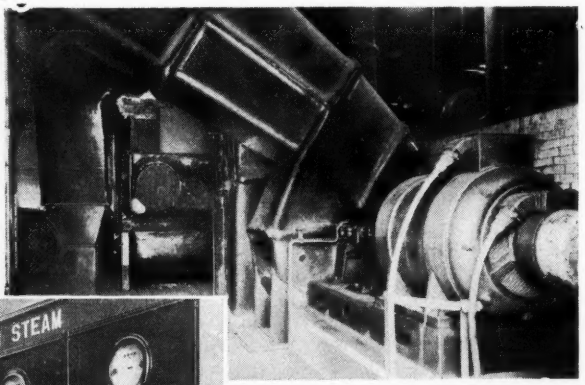
Above : With one exception each boiler house has eight 13,000 lb. per hr. Lancashire boilers Left : "Centralisec" control is provided for two boiler batteries

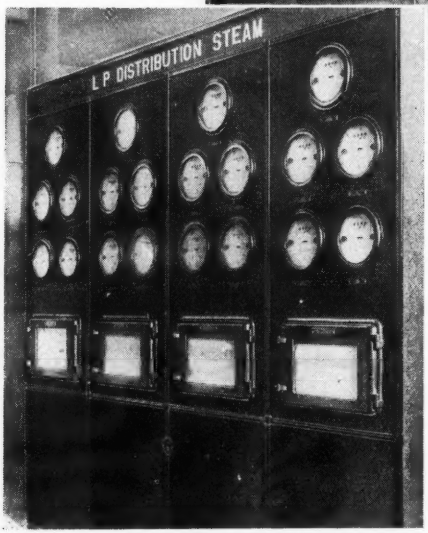
Two Weir steam-turbine feed pumps, one for 15,000 and the other for 7,500 gal. per hour,

serve the complete installation of boilers, with a motor-driven unit as stand-by. The feed pumps take their suction from two 16 ft. by 13 ft. by 9 ft. tanks which receive water from the public supply undertaking, or alternatively, the factory artesian well borehole supply. Water treatment is effected by "Alfloc" treatment plant.

Each battery of boilers is complete with a Green economiser with a heating surface of 3,500 sq. ft. and an Owen air preheater which is designed to provide an air inlet temperature to the furnaces of 260 deg. F., and absorbs heat from the flue gases which have a final temperature of 300 deg. F. A Sirocco 34-HP motor-driven forced-draught fan and a similar 90-HP motor-driven induced-draught fan serve each battery, the normal air path being—f.d. fan, air preheater, furnaces, economiser, air preheater and chimney—there being a 60-ft. stack with a grit arrester for each battery. A Thompson submerged ash conveyor elevates and delivers the ashes to an outside bunker for discharge to lorries for disposal.

The exception referred to earlier is a boiler house equipped with four dry-back multi-tubular boilers, each of which operates at 120 lb. per sq. in. and has an output capacity of 10,000 lb. per hour. Each boiler is served by a one ton per hr. Bennis independent automatic coal elevator with a receiving hopper covered by a 2½-in. mesh grid screen.





Above: Each boiler battery is a self-contained unit with its own f.d. and i.d. fans Left: Steam measurements throughout the installation are effected from one of the power stations

Feed water for the complete installation is provided by a 40,000-lb. per hr. 4,000-RPM Mather & Platt "Plurovane" pump driven by a 15-HP steam turbine, with a 13-HP motor-driven pump of the same make and capacity as stand-by. These pumps deliver from a 4,800-gal. tank which receives water from the supplies previously mentioned. Balanced draught is provided for these boilers..

Each of the power houses normally receives its steam from an outside main interconnecting all the 250-lb. per sq. in. boiler houses, but each power house is in close proximity to a boiler house. Each power station houses one 2,750-kW, 11-kV, 50-cycle, three-phase, turbo-alternator, with Daniel Adamson back-pressure, five-stage impulse turbine and English Electric alternator. The turbine receives steam at 240 lb. per sq. in. and 650 deg. F. and exhausts at 30 to 50 lb. per sq. in. and 300–350 deg. F., varying with the degree of load. The fluid link turbine governor gear is remotely controlled from the switchboard by solenoid and servo-motor equipment by means of which automatic loading and unloading of the turbine is provided for according to the varying demand for process steam.

Automatic equipment is also provided at each power station for back-pressure control of the

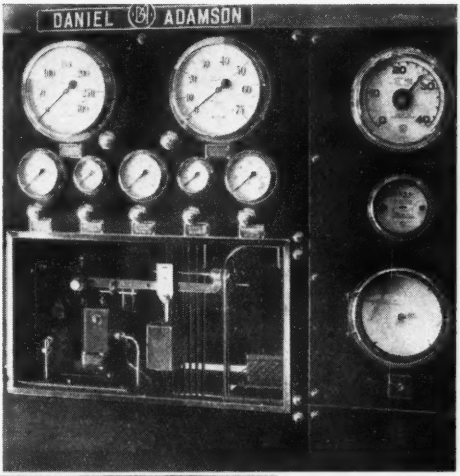
turbo-alternators for emergency conditions, whereby the factory may be isolated from the public supply.

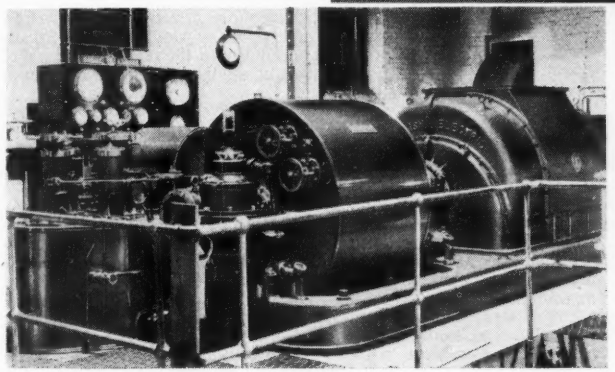
In considering the balancing of the power station scheme with the public supply the essential feature of the whole system, *i.e.*, the generation of electricity as a by-product to the production of steam, should be borne strictly in mind. The quantity of electricity available, then, as such a by-product is determined by the factory steam demand, and during the winter when the combined demand for space and process heating is very high the steam derived from electricity generated is not sufficient for the factory heating requirements. The extra steam required is made up by passing high pressure superheated steam, direct from the boilers, through reducing valves and Arca de-superheating equipments.

Each of these equipments will handle 30,000 lb. of steam per hr. at the boiler conditions, reducing it to 50 lb. per sq. in. and controlling it between 300 to 450 deg. F. A measure of temperature compensation is thus afforded to the mixed steam condition on the low-pressure mains, as the degree of steam superheat can be varied to suit extreme conditions of cold and thus minimise losses in the extensive low-pressure steam distribution system. The Arca oil-operated unit which provides the automatic control for this equipment is motor driven, a pressure relay and pilot valve being incorporated in the pumping unit. The oil unit also operates the spray valves of the de-superheater, while water for the sprayers is provided by a 4,000-lb. per hour 100-lb. per sq. in. motor-driven Worthington Simpson centrifugal pump. During the summer, however, when the factory heating demand is relatively small, the balance of electricity to meet the factory electricity requirements is "imported."

It will be seen, then, that for the greater part of the year the operating turbines and the by-pass equipments are all in parallel with the low-pressure steam mains, that the alternators are in parallel with each other and the public supplies, and that the maximum demand on the public supply is kept relatively low.

An Electroflo installation in one of the power stations remotely measures the whole of the low-pressure steam which passes to the factory by means of 20 integrating meters which record the rate of steam flow at that number of points around the factory. For various reasons it is not convenient to meter the steam flow through the turbine, but as the total steam and by-pass steam are separately metered the steam to the turbine is calculated on a difference basis. All the power stations are also interconnected on the low-pressure steam side.

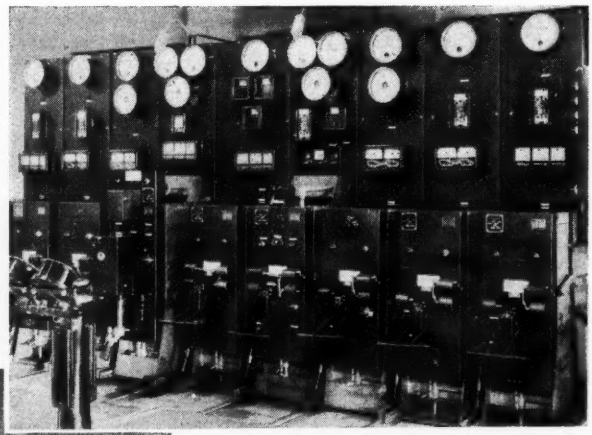


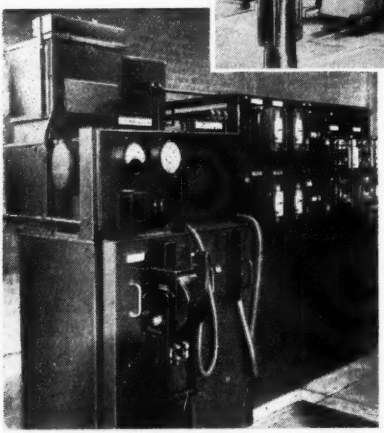


The turbine accepts only a sufficient supply to maintain the factory electrical load; the illustration above shows the regulating equipment Left: Each power station houses one 2,750-kW back-pressure turbo-alternator set

The alternator is a standard equipment and is cooled on the closed-circuit principle, employing a fan-operated cooling tower. The star-point of the alternator is earthed by means of a suitable resistance which is controlled by an oil circuit-breaker. The latter is equipped with an audible alarm, indicating leakage conditions.

Control in each power station is effected by means of a hand-operated English Electric metalclad, compound-filled switchboard, which in each case controls the generator, outgoing feeders to the factory, interconnectors to other power stations, public supply and house transformers. All the units on this board have carrying and rupturing capacities of 300 A and 150,000 kVA, and they are interchangeable.





Above: The high-voltage switchgear is hand controlled, and, with its complement of instruments, it constitutes the control board Left: Provision is made at each station for the summation metering of the maximum demand on the bulk supplies

There is separate pedestal-mounted equipment for synchronising the station with the other stations and the public supply, including remote operation of one power station equipment from another.

Protective gear of the Translay type is fitted to all outgoing feeders, and of the Merz Price type to the generators. Power for operating protective relays, etc., is provided by a station battery of the nickel-cadmium type and of 145-Ah capacity. It is trickle charged.

A typical station transformer is of 250-kVA capacity and it feeds at 400/230 V to an English Electric low-voltage distribution board. Each power station has direct communication with the bulk supply switching station and there is an "Audisign" combined telephone, visual indication and audible alarm system which provides intercommunication between all the power stations and all the boiler houses. Each power station and boiler house is also connected with the factory automatic telephone system. There is also a system of alarms by which any emergency tripping condition on the high-voltage panels is indicated at all the power stations simultaneously.

The two public supply feeders are connected to separate generating stations *via* 2,500-kVA, and 4,000-kVA, 11-kV one-to-one ratio transformers, respectively. The arrangement gives complete isolation of the factory installation from the outside supply, so that an earth fault, instead of being transmitted in or out of the factory, is transposed into an overload. The bulk supply transformers are equipped for remote tap changing.

Radio Manufacture in Sweden

IT is reported from Stockholm that a new company, Radioindustriens Fabriks Aktiebolag (RIFA), is being formed to manufacture parts of wireless sets which have hitherto to a large extent been imported. The new company will take over a factory belonging to the Nordarmatur company, and production is expected to start next year.

Hydro-Electric Economics

Capital Charges and Coal Costs

AT a meeting of the INSTITUTION OF CIVIL ENGINEERS in London on December 1st, a paper entitled "Hydro-Electric Development: Some Economic Aspects" was read by Messrs. J. K. Hunter and R. W. Mountain.

The authors pointed out that the belief had long existed that water power represented a natural source of energy which could be developed at a cost far below that of steam or other alternatives. The spectacle of "water running to waste" had been held to be conclusive evidence that its utilisation must result in the production of cheap power, and the popular clamour to which this feeling gave rise had, in the past, led to the development of water-power sites which could not have been justified from a detached economic analysis.

While State policy and the demands of national security might legitimately influence the development of a country's water-power resources, the main background of the problem remained an economic one and the first question to be answered was whether the proposed water-power scheme would reduce the average cost of electricity to the user.

The contemplation of water power for generating electricity had altered in recent years and now, instead of being regarded as only of local interest for the purpose of supplying local needs, either a specially established industry or the needs of a community, the utilisation of water power—except in those countries where the electricity supply industry was still comparatively undeveloped—must be regarded from the point of view of providing additional generating capacity for an existing system of connected generating stations, *e.g.*, the grid in this country.

Complementary Operation

Those changed conditions produced two important results. First, the interconnection of the water-power site with an existing large system provided for great flexibility in planning and, within certain limits, permitted the size of the generating plant to be selected regardless of the load to be served. Secondly, use could often be made of the existing interconnected system to transmit electricity from the water-power site to the load centre and, where this facility existed, the extra capital expenditure for transmission, which normally would be charged against the hydro-electric generating station, would be considerably reduced.

After a detailed study of the various conditions applying to steam and hydro-electric power stations, the authors stated that the ratio between hydro and steam capacity in any large interconnected power supply system might vary within the widest limits, depending upon the availability of good water-power sites and such factors as the cost of coal and the possibility of securing cooling water. It was not sufficient, when considering the economic value of a water-power site, to make a simple comparison with the cost of steam power. If the proposed hydro plant was to form part of an interconnected system, as would usually be the case, then it was essential to study the secondary effect which its construction would have upon the economy of the whole system.

Continued improvement in the design of steam plants rendered it more difficult to justify the use of water power for base-load purposes, but increase in coal cost, or a reduction in the rate of interest on capital expenditure, would have the reverse effect. In the past two decades, owing to recognition of these factors and to the development of electrical interconnection, the tendency had been to increase the installed capacity in relation to the average stream flow.

Discussion

Mr. W. T. Halcrow said that the subject was very complicated and hardly suited to generalisation; he regretted that the authors had not mentioned specific cases in detail. In his view every case must be dealt with on its own merits. The strong argument in favour of water power was that the cost of power was always known, whereas in the case of steam plant there was the fluctuation due to the variations in the price of coal. With regard to the development of water power in this country and the reasons why progress had been so slow, he said that with the exception of the Galloway scheme, which was in the south of Scotland, Parliament had not allowed a Bill to go through since 1922, although six Bills had been deposited. That was due to the opposition of vested political interests, and the coal industry and sporting rights. Steam stations did not require statutory authority. On a 33 per cent. load factor basis there was about one million kW of water power available in the Highlands and had that been taken in hand it would have been very valuable indeed to-day. In his view it was a sane policy to utilise all the water power available, even if the estimated cost in the first year of operation was higher than would be the case with steam.

Mr. E. Bate (chief engineer, Victorian Electricity Commission) spoke of the endeavour made in Victoria to work steam and hydro-electric power stations in conjunction

with one another and the extent to which this policy had been developed at the present time. When the scheme was originally discussed, however, it was decided that it would be essential to have a steam-driven station in operation before starting on the water-power stations. Originally it had been intended to work the hydro-electric power stations at 100 per cent. load factor, but experience had shown the possibility of operating them at as low a load factor as 30 or 40 per cent. There was, of course, the cost of the long transmission in the case of water-power schemes and he suggested the authors had not taken that into account sufficiently. He stressed the long life of the civil engineering works in water-power schemes and said very little need be set aside for depreciation. With the lower rates of borrowing which he anticipated after the war he saw excellent opportunities for developing water-power stations working in conjunction with steam stations.

Load Factor and Costs

Mr. S. Bryan Donkin recalled that he had shown in his presidential address to the Institution in 1936 that hydro-electric schemes became cheaper than steam when the load factor was 40 per cent. or over ; below that figure, steam was cheaper. The authors had been so cautious that they had almost implied that the use of hydro-electric power stations at low load factors could hardly be economically justified, but they had based their comparisons on 1938 prices. In the future the high prices of coal and low rates of interest would favour hydro-electric power.

Sir Alexander Gibb considered that the importance of developing water power in this country had not yet been sufficiently appreciated, but to ensure success the civil engineer must work with the electrical engineer. The former often had more to do with the success of such schemes than the latter, but many hydro-electric schemes had been developed without calling in civil engineers at all and, as a consequence, there had been many failures and expenditure of unnecessary capital. The whole position had been changed by the construction of the grid, which he regarded as one of the finest things this country had ever done. The ideal hydro-electric scheme was one in which all the available water was stored and used to generate power for some industry, any surplus passing into the grid. Speaking of the opposition to water-power development, he said the Severn scheme would have been in use to-day but for the opposition of the South Wales miners.

Mr. E. F. Bergstrom spoke of the influence of the varying price of coal on steam power stations and supported the view that interest and depreciation on the permanent works of a hydro-electric station need be very little, owing to the long life.

Mr. A. McKinstry (Babcock & Wilcox, Ltd.) said it could not be taken for granted that hydro-electric power was cheaper than steam power, and every case must be taken on its merits. He regarded the generalisations in the paper as too sweeping and quoted some examples to prove this. He emphasised that steam efficiency, or as the Americans called it, "dollar efficiency," was very often forgotten and in most cases, in the last resort, it was that which would swing the balance.

Dr. J. F. Crowley emphasised the need for developing water power for metallurgical and chemical industries as a matter of national security. The Germans declared war in 1914 just at the moment when the first plants for manufacturing synthetic ammonia were put into operation and three more followed during the war. Without them Germany could not have fought the war. Again, in 1939, the first plants for the manufacture of so-called synthetic rubber were in operation in Germany. That was an important aspect of the development of water power in this country.

Much of the difficulty met with in the Highlands was that proposed schemes would have diverted water from large surrounding areas and there was strong objection to that. Instancing what could be done to interconnect water and steam-power stations, he emphasised that 50 per cent. of the power supply of Paris came from water-power plants in the South of France and he pointed out how water-power plants could be used to assist steam stations to meet their peak demands.

The authors did not reply to the discussion.

Australian and American Standards

WE are informed that the following Australian and American Standards have recently been received at the offices of the British Standards Institution, 28, Victoria Street, London, S.W.1, where they may be inspected or obtained on loan :—

Australia.—" Electricity Meters " (SAA C39-1942).

United States.—" Electric Water Heaters, Domestic Storage " (Federal Specification W-H-196) ; " Static Electricity " (NBS Circular C438) ; " American Recommended Practice of Industrial Lighting " (ASA A11-1942) ; " Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines " (ASA C2.2–1941) ; " American Standard Specification for Dry Cells and Batteries " (ASA C18–1941) ; " Illuminating Engineering Nomenclature and Photometric Standards " (ASA Z7.1–1942) ; " Guiding Principles for the Selection of Reference Values for Electrical Standards " (AIEE No. 3, proposed) ; " Standards for Apparatus Bushings and Test Code for Apparatus Bushings " (AIEE No. 21) ; " Standard for Air Switches and Bus Supports " (AIEE No. 22) ; " Standards for Switchgear Assemblies " (AIEE No. 27) ; and " Neutral Grounding Devices " (AIEE No. 32, proposed for trial use).

INSTITUTION PROCEEDINGS

Mine Drainage Plant. Overhead Line Construction.

LAST week we published an abstract of an I.E.E. paper by Lt.-Col. K. Edgcumbe on "Standardisation as Applied to Industrial Electrical Instruments." This was read and discussed at a meeting of the Institution on December 3rd.

The opening speaker was Mr. P. Good (British Standards Institution), who said that the appropriate committees of the B.S.I. would give the closest possible attention to Col. Edgcumbe's proposals and to any others that might be made during the discussion. The speaker reviewed the work of the B.S.I. on this subject since 1906, and after expressing the hope that the paper would provide a suitable jumping-off ground for further improvements in standardisation, he dealt with a number of the detailed proposals in it. He suggested that B.S.89 should provide for an effective continuity of performance. There were specifications for flameproof tests apart from B.S.89 although they meant that the instruments as a whole had to go into flameproof cases. There was a large field for the standardisation of what would appear to be trifling details and he attributed the success of British instrument makers very largely to the efforts that had already been made in preparing standard specifications.

Industrial Instrument Standardisation

A User's View

Mr. C. W. Marshall (C.E.B.), speaking from the point of view of the user, said that in fourteen years' experience of British electrical instruments in connection with the grid trouble had occurred only with the induction type, both ammeters and voltmeters. In his view these should be dispensed with. It would be better to eliminate all but circular cases. If a straight-line scale was required it should be obtained optically. There should be widespread adoption of miniature instruments in power stations generally. Curved lines on instruments were not needed and should be eliminated and in power supply systems indicating ammeters and voltmeters served no useful purpose.

What was wanted was an instrument which would give an approximation to the short-circuit current and, by the use of a suitable shunting device, also show the normal current. Maximum and minimum voltage measurements could not be obtained other than by continual logging from the instrument. The engineer was faced with figures which might or might not have come from the instrument and recently very good approximations indeed had been obtained by the appropriate use of the indications of short-circuit currents.

Mr. B. N. MacLarty (B.B.C.) said there had been considerable trouble regarding the calibration of thermal ammeters. Although described as first grade ammeters, they were found to be anything from 10 to 25 per cent. out. He wished that makers would test ammeters at radio frequencies instead of with DC. In every large transmitter there was an ammeter which worked through a DC current transformer with which there had been difficulties that should be attended to in the next revision of specifications. He suggested standardisation of the 2½-inch size ammeter used as a modulation ammeter. Cathode-ray tubes had been used as modulation ammeters ; they were inertialess and not subject to the usual mechanical troubles.

Mr. W. Phillips said that specifications should be based on agreement between all parties concerned, but there was little possibility of agreement about mounting owing to the different methods used. He would not like to see every instrument an exact copy of those made by other makers; such a policy would arrest development. Detail development must be influenced by the discovery of new materials, such as new magnetic steels, new alloys for springs, etc., and there should be complete freedom of design in such matters. Modifications in specifications should be made through the B.S.I. and not to individual requirements.

Standard Scales Advocated

Mr. N. Ryder urged the need for greater standardisation of scales and also spoke of the need for greater consistency among users, a factor which was not within the power of manufacturers to control. To make all instruments interchangeable with regard to mounting and terminal centres was a task which would take several years to complete.

Mr. G. L. Metz said it seemed to him necessary to separate standardisation to meet home conditions from that necessary to meet conditions abroad. The standardisation of electrical instruments in this country could be achieved quite easily, but it was much more difficult to decide whether the time had really arrived for it. Should it be all-embracing from the point of view of production, or should there continue to be standardisation from the point of view of performance, which was only the half-way house ? The former

meant the production of a utility instrument which met average individual requirements with the minimum of labour and at a fairly low cost.

Mr. F. E. J. Ockenden thought that not only was it necessary to consider the user generally, but also to endeavour to tighten up some of the specifications already existing which he felt were rather favourable to the manufacturer.

Mr. R. Borlase Matthews said that from the user's point of view the standardisation of holes and fixings was of very serious importance and it was to be hoped that full attention would be given to that in the future. The reference to portable instruments in the paper suggested that it took some time to take a measurement, but a portable instrument was used for a very short-term reading in most cases so that it was necessary for it to read accurately within a very few seconds.

Mr. C. F. Pizzey (Elliott Bros.) supported the author's deprecation of the use of the suppressed zero instrument. Although it was attractive in certain circumstances, the user must be made to understand that it was intrinsically less accurate than its zero counterpart. Mr. S. B. Jackson pointed out that graphic instruments appeared to have been neglected in this discussion and he suggested that perhaps the time had come when consideration should be given to the ratings of galvanometers in relation to graphic instruments.

The author touched briefly on a few matters that had been raised and promised a detailed reply in writing.

Mine Pumping

ELECTRICALLY driven mine-drainage pumps are the subject of a paper prepared by Messrs. G. B. Alvey and N. Tetlow (Mather & Platt, Ltd.) for the Installations Section of the INSTITUTION OF ELECTRICAL ENGINEERS.

Half of the paper is concerned with the pumps themselves, which may be of the centrifugal or the positive displacement reciprocating types; the rest deals with the design and characteristics of motors for driving such pumps, the object being to indicate how study of operating characteristics enables the most suitable combination to be chosen.

British pump makers have standardised their designs to suit a 50-cycle frequency so that the usual running speeds of mine-drainage pumps are 1,500 and 3,000 RPM, but the authors explain that the inclination to select high speeds with the object of reducing prime cost cannot be extended indiscriminately to mining work. Prime cost of the combination is in many cases smaller than might appear probable because, although the pump may be cheaper, the driving motor may actually cost more. Also the higher speed pump is at a disadvantage when the drainage water happens to be sufficiently acid to cause chemical corrosion, or electrolytic action, or both, as well as when it contains abrasive matter in suspension, resulting in a high rate of wear and tear.

An important factor to be considered is the high cost of providing operating staff during the full pumping periods. The advantage of employing tandem pumping sets, when this results in a reduction of the number of installations, may be considerable. There is a growing tendency in British collieries to centralise pumping; disused workings are frequently used for this purpose, serving as the central drainage points for several collieries. Still further savings can be effected by using fully automatic pumps, requiring only occasional routine inspection. These are usually float-controlled from the water level in the sump.

The authors advise a motor margin over and above the estimated pump load of, say, 12·5 per cent. in the case of a 150-BHP pump. As the size of the motor increases the margin may be reduced progressively to 5 per cent. for a 1,000-BHP pump.

Small, medium and large motors are needed for driving centrifugal pumps in mines; they are usually directly coupled and only comparatively light starting torques are required. Small and medium motors are used for ram pumps and there is reasonable freedom in selecting speed because this type of pump is usually driven through gears; they often have to start under heavy load.

In the majority of cases it is possible to use squirrel-cage motors for reliability; the advantages of direct-on-line starting are pointed out as is also the desirability of simplifying control methods and equipment. Protection, both electrical and against the effects of moisture, is referred to.

Edinburgh Electrical Society

A BRIEF resume of the growth of the electrical industry in Scotland, with suggested reasons why heavy electrical engineering has not progressed relatively to the developments in England, was given by Mr. J. Rodger, M.I.E.E., chief engineer of Bruce Peebles & Co., Ltd., in an address at a recent meeting of the EDINBURGH ELECTRICAL SOCIETY, inaugurating its twenty-fourth session. Mr. Rodger showed how the firm of Bruce Peebles had grown from early makers of gas meters to one of the chief general electrical manufacturing concerns in Scotland, and illustrated his talk with lantern slides showing some of the company's notable peace-time products.

The hope was expressed by the chairman, Mr. J. G. Mackintosh, that all members would endeavour to add to the strength of the

Society during the session. He announced that it had been decided to hold a special competition in aid of the E.I.B.A.

An address on " The History of the Steam Engine " was given by Mr. J. F. Field, B.Sc., A.M.Inst.C.E., A.M.I.E.E., of the Edinburgh Corporation Electricity Department.

Arrangements for future meetings include an address by Mr. A. Louden of the General Electric Co., Ltd., on " Ways and Means of Saving Fuel," on December 16th.

Transmission-Line Design

PARTICULARS of serious damage caused by snowstorms to power transmission lines in Ireland in 1933-36-37-40 and 41, together with details and some cost figures of consequential departures from conventional designs of lattice-steel and wood-pole circuits are contained in a paper prepared by Mr. A. Burke (Electricity Supply Board, Dublin) for the Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS.

The damage to wood pole lines has taken the form of broken conductors, mainly on the lighter 10-kV lines ; with rare exceptions, the poles have not been injured. In the case of steel-pole lines broken conductors have nearly always been associated with completely, or partially, wrecked masts. The factors governing the examination of breakdown data are critically analysed and conclusions formed in particular cases briefly stated. Loadings are compared with those specified by the British Overhead Line Regulations and the effectiveness of the universal method of controlling the factor of safety of conductors without reference to the span length is challenged as being definitely ineffective. The author considers that method to be reasonable only on the assumption that weather conditions are never worse than those specified, but that the conductors may lose half their strength. That supposition he believes to be untenable, since more severe conditions do occur regularly and also because conductors should be repaired, or replaced, before they lose any considerable fraction of their strength.

The superiority of a horizontal over a triangular arrangement of conductors is viewed from a new angle and the reasons for adopting horizontally arranged conductors on wood poles for 260 miles of 110-kV line are stated. Various problems associated with the design of that line are set out and costs mentioned to show that the wood-pole line is much more economical than one carried on lattice steel towers.

The author concludes that, apart from the mainly theoretical work of individuals and organisations on specific problems, there has been little progress in the design of transmission lines as a whole. He therefore advocates the setting up of an authoritative organisation to clarify the situation by its own research, as well as by collecting and analysing the work of others. The ultimate objectives should be the formulation of a rational code of regulations, both directive as well as restrictive, and the standardisation of formulæ and methods of calculation and design, with particular reference to their limits of accuracy.

Theory is on the whole quite conclusive, lacking only reliable values for certain variable factors and experimental proof of some doubtful aspects. Conclusions cannot be forced, for example, in respect of the spacing and vibration of line conductors. It is remarkable also that there are as yet no accepted conclusions about the quantitative effect of conductor tension, or about the characteristics of clamps on the life of a conductor subject to vibration. Although the amount of investigational work to be undertaken by the suggested organisation would be considerable and the expenditure fairly large, the author believes it would be fully justified.

Safety in Mines

THE Lothians Branch of the ASSOCIATION OF MINING ELECTRICAL AND MECHANICAL ENGINEERS discussed the annual report of the Electrical Inspector of Mines at a meeting in Edinburgh recently.

Mr. J. Cowan, Junior Electrical Inspector of Mines, commenting on the report, said that personal risk from mining electrification was being gradually reduced by the introduction of apparatus designed to operate with all known safety devices. During 1941 only three fatal accidents due to electric shock occurred, the lowest number in any year since 1908. The reported accidents proved, however, that slackness, neglect, misuse and abuse in respect of electrical plant must result in risks to life and limb, and imperil the hopes of meeting the vital war demand for coal.

Sound Reproduction

AT the November meeting in London of the BRITISH INSTITUTION OF RADIO ENGINEERS, Dr. L. E. C. Hughes read a paper on " The Technical Basis of Sound Reproduction," general in character and based on his experiences as technical adviser to the Central Council for School Broadcasting.

After a historical introduction dealing with the definitions of " sound " and " noise," he gave a formula for determining the effect in a given auditorium. The final test was always a subjective one, and the method he advocated was to use two separate rooms with a microphone in each to represent the listener, and to compare their outputs sub-

jectively at the remote end of a very good quality amplifier. In the tests conducted by the Apparatus Approval Committee of the Central Council for School Broadcasting, non-technical audiences voted subjectively on the quality of reproduction on a scale attained entirely by experience.

In the discussion which followed, doubts were expressed about the validity of subjective tests, but Dr. Hughes stated that a completely new panel had, in duplicate tests, returned votes which were within 1 or 2 per cent. in agreement with the regular panel. Mr. P. G. A. H. Voigt, in proposing a vote of thanks to Dr. Hughes, described two simple methods of making comparative tests.

Women Engineers

AT a recent meeting of the Manchester branch of the WOMEN'S ENGINEERING SOCIETY (which was inaugurated in September) held at the Engineers' Club, Manchester, Miss A. G. Shaw, M.A., spoke on the training of women for industry. She expressed the opinion that the scope for experienced women engineers after the war would be very great and instanced industrial design as a suitable field for women of ability.

Mr. J. C. Jones, principal of the Salford Technical College was present and mentioned the Government scheme for training ex-secondary school girls who were taking up technical work. Miss E. Blades (Ministry of Labour and National Service) suggested that members might like to visit a Government training centre and offered to make the necessary arrangements.

This offer was accepted and on November 19th and 28th members paid visits to the Cheetham Hill centre.

Forthcoming Events

Institution of Electrical Engineers.—*North Midland Centre.*—Saturday, December 12th, 2.30 p.m. Great Northern Hotel, Leeds. Paper: "Public Address Systems," by Mr. S. Hill.

North-Western Students' Section.—Saturday, December 12th, 2.30 p.m. Engineers' Club, Manchester. Paper: "A Review of Modern Methods of Feeder Protection," by Miss J. Allam. 5.30 p.m. Manchester University Unions. Christmas dance.

Irish Centre.—Thursday, December 17th. Paper: "Modern Railway Signalling," by Mr. H. J. Guthrie.

North-Eastern Students' Section.—Friday, December 18th, 6.30 p.m. Neville Hall, Westgate Road, Newcastle-on-Tyne. "Automatic Telephone Switching," by Mr. L. Mew.

West Wales (Swansea) Sub-Centre.—Saturday, December 19th. Paper: "Field Measurements of Insulation."

Association of Supervising Electrical Engineers.—Saturday, December 12th, 2.15 p.m. Lighting Service Bureau, 2, Savoy Hill, W.C.2. Lecture on "Electricity Supply," by Mr. J. I. Bernard.

NEW BOOKS

Electricity Tariff Types. By D. J. Bolton. Pp. 47; figs. 8. Chapman & Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 5s.

Looking forward to the immediate post-war period as particularly favourable to the rationalisation of electricity supply charges, Mr. Bolton advocates the codification in a single authoritative document of the main lines of tariff construction. There is probably a greater measure of agreement on the subject than might appear to be the case superficially but, before this can lead to effective action, a more widely spread understanding of the nature and incidence of tariffs of all types is necessary.

This book is a welcome piece of preliminary spadework towards that end. It surveys the chief examples of industrial and domestic tariffs, making sound recommendations in each case, and discusses the compromises attempted between the interests of seller and buyer in order to secure a sound commercial position for the undertaking and, at the same time, to devise a method of payment that is attractive to the consumer, due regard being paid to the competition of non-electrical methods and to the elasticity of the demand, *i.e.*, its sensitivity to price changes. Differences in these respects and in the scale of values attached to them by the two classes of consumer explain the inherent dissimilarity between the forms of tariff employed in each case.

The inclusion in the book of a glossary of the definitions that have been proposed for the revision of the British Standard Glossary, BS. 205, illustrates the importance of the adoption of standard nomenclature.

The construction of electricity supply tariffs is a matter for specialists, but owing to the clear manner in which the data have been assembled, this book is likely to give a good insight into the needs of the situation not only to electrical engineers but also to laymen wishing to learn something of the elements of a much discussed but far from simple subject.

Shorter Notices

Works Boiler Plant. By F. J. Matthews. Second, revised edition. Pp. 176; figs. 88. Hutchinson's Scientific & Technical Publications, 47, Prince's Gate, London, S.W.7. Price 10s. 6d.

This new edition has been published because it is felt that the tried and proven methods outlined will assist even the smallest steam user to save fuel.

Essential Metallurgy for Engineers. The Causes and the Control of Metallic Properties. By A. C. Vivian. Pp. 155; figs. 33. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 8s. 6d.

Temperature Control. By A. J. Ansley. Pp. 127; figs. 81. Chapman & Hall, Ltd., Price 13s. 6d.

Applied Electricity. By A. W. Hirst. Pp. 290; figs. Blackie & Son, Ltd., 50, Old Bailey, London, E.C.4. Price 15s.

Radio Engineering. Edited by R. C. Norris. Pp. 512; illus. Odhams Press, Ltd., Long Acre, London, W.C.2. Price, 6s. 6d.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Electrical Laboratories

AS a postscript to my article on "College Laboratories," which you published on October 16th, I agree generally with Dr. Wilson's letter of comment in the *Electrical Review* of November 27th. I certainly think that rotating machinery has had too complete a predominance in the power section of college curricula, to the detriment of static power apparatus. I did not intend to imply (as I may seem to have done) that thermionic apparatus was the only alternative to rotating machinery. It is probable that the influence on college curricula of John Hopkinson's great genius has been even greater than it deserves to be.

Tests on such apparatus as that mentioned by Dr. Wilson—current transformers, electromagnets and unsymmetrical networks—together with, for example, tests on rectifiers and regulators and on vibration instruments may be included in a college course with great advantage.

In introducing practical tests on switch and control gear there are, however, two difficulties. First, it is difficult to separate the principles from the "gadgetry" and to disentangle what is empirical from what is essential and, secondly, the plant needed for the proper testing of switchgear is some of the largest of all testing gear. Indeed, there are only four or five of these plants in the whole of Great Britain. Something about switchgear should certainly be included in teaching curricula, but practical testing is open to the same sort of objection as high-voltage testing in general and is too much to attempt in a college laboratory.

Aberdeen. G. H. RAWCLIFFE.

[Dr. Wilson has seen Mr. Rawcliffe's letter and his reply is printed below. *Eds. Elec. Rev.*]

MR. RAWCLIFFE'S general concurrence with my views on the value of testing static apparatus in college laboratories is much appreciated. I would add that I am in agreement with his reservations as regards "gadgetry" and the avoidance of expensive short-circuit tests.

All the tests I suggested were designed to comply with these conditions, being such as are required in practice in order to prove the design of the apparatus. When these are carried out in college laboratories, students can be encouraged to work out the anticipated result, and the check between the calculation and the experimental finding will render the tests especially instructive. In selecting my list of subjects I had particularly in mind those that exemplified important calculations in connection with their design.

As regards cost, I have always been against megalomania in connection with college laboratory plant, and would agree just as strongly that high-power testing should be avoided as well as h.v. work. I have not specified breaking-capacity tests in connection with item 3 (Circuit-breakers). As one responsible for one of the high-power testing plants mentioned by Mr. Rawcliffe, I can well appreciate the unsuitability of these for his purpose, the overhead expense being about £1 per minute while the tests are dangerous and also very complicated. I have recommended short-circuit tests in connection with item 1 (Fuses), since adequate breaking-capacity tests can be made on small units by means of a medium-sized generator, such as is to be found in most electrical laboratories. The only other unusual electrical supply required would be in connection with item 7 (Conductor heating), where a heavy current transformer giving, say, 2,000 A secondary current at 5 V, would be needed, which is not expensive.

With regard to items 9 (Lightning arrestors) and 10 (Liquid resistances), omitted from my original letter and published last week, both of these will be found to comply with the conditions stated.

Witton, Birmingham. W. WILSON.

Electricity Supply Tariffs

THE letter from Mr. D. A. Picken and Mr. S. G. Harling's article in the *Electrical Review* for November 27th have their good points. Many of our "tariff reformers," however, fail to recognise the public antipathy for scientifically constructed tariffs, incorporating all manner of standing and kWh charges in different parts of the country. Scientific retail tariffs are the outcome of the form adopted for the grid tariff, which itself varies in the manner indicated.

The other aspect is that the consumer does not care how a tariff is constructed, or by whom, so long as he understands the prices charged to him and to his neighbour. This is hardly possible when every undertaking has a right to review its tariffs whenever it chooses.

Tariffs have a background which ought not to be ignored. For a number of years now the average person has believed that the grid is a Government idea for improving social conditions for everybody whether living in urban or rural areas and that, consequently, he is entitled to his share. The question of ownership of the supply undertakings by

which these amenities reach him seems to him of no account.

Here the considerations become political and the question arises as to whether electricity supply undertakings shall be described as essential social services, public services or private undertakings conducted for profit. This question will need to be answered shortly by those in authority. For some time past, the impression has been that electricity supply was a public service, but if it is a public service, then the administration should be a national and not a local concern because its function should be to carry out the instructions and the policy of the Government.

My own view is that the grid tariff should be entirely remodelled in order to meet the changed conditions. It should, preferably, be somewhat along the following lines : The grid to undertake to supply the requirements of various undertakings on the basis of 70 per cent. of the takings for power, 50 per cent. for domestic supplies, 25 per cent. for public lighting, 10 per cent. for rural supplies. At the same time, the national tariffs for the various supplies should be declared by Parliament. I see no other way of national development and the elimination of all manner of tariffs than by taking administration out of local hands and placing it in the hands of the Electricity Commissioners. We may then be within measurable distance of the ideas of the average person, *i.e.*, units at three a penny without discrimination in the manner of use or the point of delivery.

Whitworth, Lancs. JAMES RATCLIFFE.

FOR the individual undertaking proposals for standard fixing are more attractive than the alternative of standard prices. Provided consumers are content with several hundred different prices throughout the country, standard price fixing has the advantage that it compensates automatically for lean areas, high-load-factor supplies, etc., and does not attempt to subsidise to the extent that would be inherent in the alternative proposal.

Mr. Harling's suggestion, in your issue of November 27th, of one method of standard price fixing is interesting, but requires more explanation and definition. The first stumbling block would be the determination of the cost price. Interest charges, sinking funds, contributions to rates would all require definition and perhaps limitation. Controls to prevent excessive capital expenditure or "watering" would have to be introduced. An agreed basis for reducing all kWh to, say, equivalent low-voltage kWh, would be needed.

The ratio $\sqrt{\frac{LF}{lf}}$ gives some curious effects, LF being the undertaking's load factor and lf the consumer's load factor. Load having a lf better than LF pays the undertaking handsomely and subsidises the low lf loads. Presumably most loads have lf $<$ LF, though some of the disparity between LF/lf and $\sqrt{LF/lf}$ will be covered by the usually better diversity of low lf loads. In this respect the undertaking with a low LF will be better protected. In the example quoted heating load having a lf of, say, 0·1 will be charged at $\sqrt{0{\cdot}36/0{\cdot}1}$, *i.e.*, 1·9 times the average price instead of 3·6 times. As the diversity will approach unity, insufficient revenue will be secured.

For domestic heating the charge would be $1{\cdot}9 \times 0{\cdot}4$, *i.e.* 76 times the average, in other words a diversity of 3·6/0·76 would be necessary to achieve a balance, apart from the subsidy effect. Perhaps Mr. Harling could explain how his figures of 0·6 and 0·4 were obtained. Though for some domestic load 0·4 might be reasonable, it is difficult to appreciate why deliberately restricted off-peak load should be sold at a higher rate than domestic load.

The necessity of installing 8 or 9 million thermal indicators is mentioned rather casually. Though the measuring of everyone's maximum demand would be most desirable, it seems doubtful whether official blessing would be given to a scheme requiring so much new apparatus.

Ringwood, Hants. R. B. ROWSON.

MR. S. C. HARLING'S article, in your issue of November 27th, lays down as a fundamental principle that the price per kWh must bear a reasonable relation to the cost of production and distribution and also to the consumer's demand and that non-trading consumers should bear a lower proportion of the cost. Why should non-trading consumers have lower charges ?

A serious objection to the proposal is that it complicates metering and adds to the cost of metering equipment and meter reading. As regards the proposed standard basis, most, if not all, undertakings are charged on their annual maximum demand, and presumably the consumer would be charged on his quarterly demand. There is a difference here, and therefore consumers would not bear their correct share of costs. In addition to this, it does not follow that a number of consumers with poor load factors should be charged an excessive price when, due to the diversity of the loads, it would in all probability be found that the cost of providing the total load was no more than for a similar load to one consumer.

The suggestion that off-peak supplies should have better treatment than industrial consumers is in my opinion not sound. Many undertakings have peaks which do not coincide with the national peak, and much depends on the timing of this off-peak supply. For some undertakings the time of the peak has changed and what was once an off-peak supply eventually became part of the peak load.

The difficulty of devising a standard tariff is due entirely to the m.d. charge. This bears very little relation to the cost of providing a supply and, as long as it remains, engineers will exercise their ingenuity in framing new tariffs to minimise its harmful effects to the supply industry. No supply authority can confidently forecast its cost with accuracy for next year. A standard tariff will never be made until the m.d. charge is abolished.

Welwyn Garden City. B. CROWSLEY.
Mains Engineer.

[Mr. Crowsley sent a copy of his letter to Mr. Harling who replies as follows :—]

I WISH Mr. Crowsley had put forward in his letter his own suggestions for an ideal tariff so that a useful comparison could have been made. His remarks regarding off-peak charges and maximum-demand tariffs are not borne out in practice. It is an axiom that public necessities should be provided at cost price, whereas trading concerns run for private profit should be operated on a profit basis.

The introduction of a single meter with a maximum-demand indicator would actually effect a saving in cost and a simplification of meter reading compared with present systems where (except for all-in domestic tariffs and existing maximum-demand tariffs) several meters are used to measure different rates of charge to one consumer, with consequent complication of accounts and expense in the consumers' wiring to keep the various loads separate. The maximum-demand readings in conjunction with records of consumers' installed apparatus, network loading and housing density would form a valuable asset for progressive distribution design and load building. Maximum-demand charges would be annual with quarterly readings and bills, being adjusted where necessary at the end of the year.

The cost of electricity supply is inseparably connected with maximum demand and more particularly with load factor. It follows that consumers with a high load factor should pay a proportionately lower average rate per kWh. Thus lies the way to progress.

A modern conception of off-peak loads does not tie them all down inflexibly to certain pre-determined hours. They would be split up into blocks to correspond with the varying peak tendency and the consumer's convenience. A signal transmitted over the mains would warn important consumers to reduce their loads and after a few minutes the metering would be changed to on-peak rate. Other consumers with loads such as thermal-storage would have the particular load tripped out by the signal system. These signals would only be sent out when the load on the undertaking justified the load shedding, thereby minimising the interference with consumers' supplies while still enabling a lower price to be given. This system is already in operation with consumers taking up to two million kWh per annum, and has conferred considerable benefit upon both consumer and supplier.

It would be interesting to hear how Mr. Crowsley would supply the necessary mains and services for, say, 1,000 consumers each with a load of 10 kW and a diversity factor of 5 for the group, for the same capital cost and distribution loss as a supply of 2,000 kW to one consumer, bearing in mind that an average domestic consumer has a load factor of 1·5 to 5 per cent., whereas industrial consumers often have load factors of 20 to 60 per cent. and sometimes up to 90 per cent.

Chester. S. C. HARLING.

Textbook Inquiry

MANY men in my position would be grateful if any of your readers could recommend a few elementary textbooks on routine electrical equipment likely to be of use to office workers who have little or no technical knowledge but wish to know more about the equipment with which they deal commercially.

I am engaged in a clerical capacity with a firm of electrical engineers and, while I have some knowledge of electrical stores generally, I frequently feel the need for more precise information, such as, say, the difference between squirrel-cage and slip-ring type motors and their respective starting gear, etc. I realise the extensive nature of the subject and that a proper course of study is desirable, but, unfortunately, I cannot manage this under existing conditions.

Sheffield. INQUIRER.

Lighting and Fuel Economy

IN his letter in your issue of November 20th, Mr. Pilkington appears to overlook the psychological aspect with regard to lighting installations, including questions of contrast and glare. A bare gasfilled lamp, whether pearl or clear, causes considerable discomfort when used in the line of vision without any obscuring or diffusing media. His arguments appear to be based on the assumption that foot-candles on the working plane are the only criterion, but some time has elapsed since that fallacy was discarded.

In my earlier letter I did not question the estimated saving of 700,000 tons of coal given by Mr. Pilkington in your issue of October 16th, but I have yet to learn that the cessation of energy consumption during off-peak periods will provide material saving, if a supply of energy has to be maintained. Energy for lighting is usually dissipated nowadays at times when station peak loads do not exist.

Photometric tests showing that pearl lamps have the same lumen output as clear lamps of

the same wattage may be accurate enough for commercial purposes. Nevertheless, the surface brightness of the pearl lamp is far too high for the lamp to be used as a bare pendant and the gloom which I suggested would result from the use of bare pearl lamps is a mental and not an optical state. Redecoration is not so nearly impossible as Mr. Pilkington suggests, as distemper is still obtainable and is fairly easy to apply. A simple test which he could carry out in his own home would, I feel sure, convince Mr. Pilkington of the unpleasant results that would follow the carrying out of his suggestions.

His reference to the possible unreliability of the human element in connection with the switching out of lamps when rooms are not in use is hardly logical, as he assumes that that same human element will readily put up with the discomfort of bare lamps. Has not the human element shown that it can be relied upon to be economical in the use of fuel when sufficient reason for that necessity is given to it?

Leeds. J. H. MOLLAN.

The I.M.E.A. Advertisement

SURELY the recent advertisement for an electrical engineer and manager by the I.M.E.A. is a sequel to the result of the previous advertisement for a similar appointment. The surprising thing is that the E.P.E.A. should take it upon themselves to act as critics of the I.M.E.A. While I have no authority to speak for the I.M.E.A., my own views are that it is practically one hundred per cent. representative and is non-political with a highly developed sense of duty to consumers, local authorities and electrical engineers. A more capable or suitable body, for the purpose, would be difficult to find.

Bangor, Caernarvon. F. O. HARBER.

PARLIAMENTARY NEWS

From Our Special Reporter

Utility Wireless Sets

IN the House of Commons last week, Mr. Woodburn asked the President of the Board of Trade whether he was now in a position to say if, and when, utility wireless receiving sets were likely to be made available to the public.

Captain Waterhouse, who replied, said that owing to the very heavy demand by the fighting Services for radio equipment of all kinds, the production of sets and components for the civil population had had to be severely curtailed. A considerable number of civilian sets were still in process of manufacture and it was most economical to complete these before embarking on the production of a utility set.

Mr. Woodburn asked if it were possible, pending the time when it was feasible, to produce utility sets, to facilitate the preparation and supply of repair parts for existing sets, since many sets were going out of use because of the lack of valves and other parts.

Captain Waterhouse replied that he would go into that question, but already considerable numbers of spares were available and were being put on the market.

Fuel Economy

Mr. Higgs asked the Minister of Fuel and Power what had been the approximate reduction up to date in the consumption of gas, electricity and solid fuel relative to last year.

Major Lloyd George said he regretted that it was not yet possible to make any full statement on this subject. The fuel and power requirements of certain classes of consumers, particularly war industries, the Services, and transport, were considerably above last year's figures, and to meet these requirements it was essential to secure equivalent reductions in domestic and in other types of industrial consumption, and to increase coal production. It was too early in the winter to be able to give statistics of domestic consumption of raw coal, but the first results of a sample inquiry into the consumption of gas and electricity for domestic purposes were encouraging.

No. 8 Batteries

Mr. Liddall asked the President of the Board of Trade if he would ensure that manufacturers were able to maintain an adequate supply of No. 8 torch batteries, which were a popular size.

Capt. Waterhouse said that these batteries were still being made in very large quantities. Increased supplies would also be available this winter of batteries of larger sizes which were more economical in raw materials and labour, and in cost, relative to the number of hours of light which they gave.

Harrogate's Fuel Economy

WHEN a mass meeting addressed by Commander Stephen King-Hall was held to inaugurate an eight-day "Battle for Fuel" campaign at Harrogate the Mayor (Councillor G. G. Stephenson) revealed that there had already been an excellent response from consumers to the appeal to economise. The local gas and electricity undertakings (Harrogate Gas Co. and the Corporation Electricity Department) he said, supplied an area of 300 square miles, and compared with a corresponding period of last year there had been an 8 per cent. reduction in the consumption of gas and 13 per cent. in electricity. The past month was the best of all with 12 per cent. less gas and 14 per cent. less electricity used.

Mr. A. Kelso, the borough electrical engineer and manager, informs us that there has been a remarkably good attendance at the exhibition which appears to have made a very favourable impression in the area.

PERSONAL and SOCIAL

News of Men and Women of the Industry

OLD students of Faraday House will learn with regret that the **Reverend L. Van Vestraut** has left there after an association of twenty-two years. He is rector-designate of Lyndon with Manton and Martinsthorpe, Rutland. Mr. Van Vestraut was born in Birmingham and as a child went to California with his father (a doctor). He returned to this country after two years, however, and in 1904 went to Faraday House as a scholar, where he subsequently became head student. In 1907 he joined the British Electric Transformer Co. and under Mr. A. F. Berry assisted in the design of early "Tricity" experimental cookers. In the following year he was with Boult, Wade & Tennant, chartered patent agents, and in the same year he went to Peterhouse, Cambridge, gaining in 1911 first-class honours, Theological Tripos, and taking his B.A. degree.

The Rev. L. Van Vestraut

From 1912 to 1917 he held two London curacies, and from 1915 to 1917 he was employed during the week at the Aircraft Manufacturing Co., Hendon, on design, part of the time under De Havilland. In 1917 he became M.A. (Cantab.) and during the next three years was in charge of design in the Seaplane Department of the Aircraft Manufacturing Co. at Hythe and Southampton. He resumed his association with Faraday House in 1920 as chief assistant of the Testing Department and as lecturer, and in 1927 was appointed Registrar of Faraday House, and hon. secretary of the Old Students' Association. He was elected an associate member of the I.E.E. in 1928 and recently became an associate member of the Institution of Mechanical Engineers.

Mr. D. E. Wardle (manager, Baddesley Collieries) has been elected president of the Warwickshire branch of the Association of Mining Electrical and Mechanical Engineers.

The address of **Mr. M. H. J. Stone**, M.C., M.I.E.E., formerly London branch manager of British Insulated Cables, Ltd., now home sales manager, is the head office of the company, Prescot, Lancs.

The inaugural luncheon for the heads of departments to celebrate the formation of De La Rue Plastics, Ltd. (see "New Companies") was held at the Connaught Rooms, London, on December 1st. Among those present were **Mr. B. C. Westall** (chairman), **Mr. H. P. Bridge** (managing director) and **Mr. C. G. R. Ashton**, the three directors of the new company. Details of the personnel of the organisation were announced as follows :—Messrs. J. Barnard, manager, Laminated Division ; F. T. Fletcher, sales manager for all products other than laminated ; I. K. Thom, works manager; E. Gibson Knight, manager, Scottish Division ; R. B. Harley, chief chemist ; E. A. Davis, development manager ; G. H. Hydes, progress manager ; O. D. Lucas, research engineer ; and R. E. Layzell, secretary.

Mr. D. C. Urie, superintendent of motive power, L.M.S. Railway, who has retired, was well known in railway circles. He commenced his career in 1901 with the L. & S.W. Railway at Nine Elms, where his father was chief mechanical engineer, and in 1913 he was appointed assistant manager at the Eastleigh shops. Later he was appointed mechanical engineer of the L.M.S. for Scotland and in 1932 he became superintendent of motive power, with headquarters at Derby.

Mr. H. W. Myers has been appointed a director of Strand Electric Holdings, Ltd., and of the Strand Electric & Engineering Co., Ltd. He has been secretary of the latter company for the past eighteen years.

Among the subjects discussed by a "Brains Trust" comprising Messrs. B. England, J. T Evans, E. L. Taylor, J. W. Watkins and W. Donaldson Wright at a recent meeting of the East Midlands Section of the Institute of Transport was the substitution of trolley-buses for trams. Mr. J. H. Stirk was question master.

The *Southern Railway Magazine* reports that **Mr. F. C. Elwood**, of the Engineer's Lighting, Heating & Water Department at Waterloo was recently installed as Mayor of Beddington and Wallington.

Obituary

Mr. C. T. MacKinlay.—We regret to record the death of Mr. C. T. McKinlay which occurred on November 29th, after a short illness, at the age of seventy-six. He had been associated with the electrical industry for forty-five years and, prior to this, was ships engineer to the New Zealand Shipping Co., sailing before the mast in his early days.

Mr. McKinlay was responsible for one of the earliest electrical installations in Egypt, the well-known Mena House at the foot of the Pyramids in Cairo. In 1906, he was in charge of the electrical department of John Barker & Co., Ltd., Kensington. For over twelve years he was with Falk, Stadelmann & Co., Ltd., and he also served with Carron Company for several years. From 1921 he was with the Metropolitan-Vickers Electrical Co., Ltd., the Edison Swan Electric Co., Ltd., and Harcourts, Ltd., and for the last few years he had been on the B.E.A.M.A. staff as assistant to Mr. Felix A. Rogers, secretary to the Electric Light Fittings Association.

Mr. J. B. Bingham, of Kirkcaldy, Fife, whose death is reported, was for many years assistant burgh electrical engineer of the town. He was largely responsible for Kirkcaldy's electricity and tramway schemes, having entered the service of the Corporation in 1903. He retired in 1937.

Will.—Mr. James Anderson, M.I.E.E., chief engineer of George Ellison, Ltd., left £19,557, with net personalty £17,190.

COMMERCE and INDUSTRY

Heating Appliance Supplies. Salvage Benefits E.I.B.A.

Limitation of Supplies

A FEW months ago we made a mild protest against the bracketing of two very dissimilar commodities in the Limitation of Supplies (Heating Apparatus and Polishes Order, 1942). Accordingly we are glad to learn that the Board of Trade has decided to separate them out and has issued a new Order for each, although the terms of the existing Order are repeated.

The one with which we are concerned is the Limitation of Supplies (Heating Apparatus) Order, 1942 (S.R. & O. 2430, Stationery Office, price 2d.). This covers the six months from December 1st and reduces the rate at which gas and electric space-heating apparatus may be supplied from 25 per cent. of supplies in the standard period (June 1st to November 30th, 1939) to 15 per cent. The Order does not extend to supplies by manufacturers of electric space-heating appliances which are already covered by the Electrical Appliances (Control of Manufacture and Supply) Order, 1942.

Lighting Fitting Prices

The Electric Light Fittings Association notifies us that the wartime advance in the prices of dispersive reflectors (1⅛ in. hole fixing), produced in accordance with B.S.S.232, is to be increased from 10 to 20 per cent. for all orders received and executed on and from January 1st. The sizes concerned are as follows :—10 in. diameter (40–W); 12 in. diameter (60–W); 14 in. diameter (100 and 150–W).

There is to be no change at present in the prices of other types of fittings.

Paper Salvage Campaign

As the end of the year approaches, the "visible" contribution to the collection of 5,000 tons of waste paper which was the industry's aim is still far short of the target total. That is not to say that the figure will not be reached. We suppose most firms already had their salvage schemes going, but unless they report the amounts collected to the Electrical Industry Waste Paper Recovery Committee these amounts will not figure in the total.

It was originally suggested that the proceeds from the sale of waste paper should be sent to the Electrical Industries Benevolent Association. The Committee has sent us the following list of electrical men and organisations who are passing, or have agreed to pass, money received for waste paper to the E.I.B.A. :—Adamson & Co. (Tyne), Ltd. ; Albion Radio Co. ; Mr. A. C. Alexandra ; Arc Manufacturing Co., Ltd. ; Berry's Electric, Ltd. ; British Electrical Development Association ; Cambridge Instrument Co. ; Central Electricity Board ; City of London Electric Lighting Co., Ltd. ; A. E. Dees, Ltd. ; Mr. J. Elvins ; Foster Transformers & Switchgear, Ltd. ; Gorseinon Electric Light Co. ; Hallamshire Electric Co., Ltd. ; Harland Engineering Co., Ltd. ; Keebles, Ltd. ; Kilpatrick & Son, Ltd. ; Millns Electrical Co. ; Minehead Electric Supply Co., Ltd. ; G. S. Peckham & Co., Ltd. ; Read & Partners, Ltd. ; James Robertson ; Scarborough Corporation Electricity Dept. ; Standard Wholesale Electrical Co. ; J. G. Statter & Co., Ltd. ; B. G. Suthers, Ltd. ; Wedden & Hill, Ltd. ; Wessex Electrical Wholesalers.

We again commend to the attention of all electrical firms this double-barrelled opportunity of doing valuable service—to the country and to the industry's unfortunates. The Committee's address is 2, Savoy Hill, W.C.2.

Young Shipyard Electricians

In response to inquiries from his members, Mr. L. C. Penwill, Director of the Electrical Contractors' Association, says that the Building and Engineering Construction (Young Persons) Order, 1942, applies only to works of building and engineering construction. The hours of young persons employed on shipwork are already governed by the Factory Act, 1937. Under a General Emergency Order dated May 1st, 1941, the local Factory Inspectors are empowered to fix the maximum hours of work for young persons under 18 and members who employ young persons on ship-work should consult the local Inspector and make themselves familiar with the conditions operating in their districts.

The R.E.M.E. in Action

In our issue of November 13th we described the constitution and functions of the Royal Electrical and Mechanical Engineers, which came into being on October 1st, and at a London conference last week, a senior officer told of some of the achievements of the new corps, particularly in the successful battle of Egypt. He said that although the R.E.M.E. was the youngest corps in the British Army, it was now regarded as one of the most important factors in modern warfare. It was a combatant corps of trained soldiers, and this was necessary in view of the fact that repairs were frequently carried out on the battlefield. Egypt had proved that closer co-ordination had been achieved, and the rapid advance of the Eighth Army had only been possible through the efforts of R.E.M.E. which had proved itself a repair organisation second to none in the world.

The Fair Wages Clause

In a White Paper (Cmd. 6399, Stationery Office, 1d.) the Financial Secretary to the Treasury states that in the changed circumstances of the present day there is a need for the revision of the Fair Wages Resolution in connection with Government contracts approved by the House of Commons in 1909. As a result of discussions between the British Employers' Confederation, the Trades Union Congress and the Government a new resolution has been drafted for submission to the House of Commons. In this the standard of fair wages will no longer be solely the practice of "good employers" in the district. The employer will be required to observe such con-

ditions as have been established for the trade or industry in the district by representative joint machinery of negotiation or by arbitration.

The contractor will be required to observe " fair " conditions of labour as well as " fair " wages in respect of all persons employed in the place where the contract is being executed. New contractors will have to give an assurance that they have observed the general conditions of the Resolution for at least the previous three months.

Disputes regarding fair wages will be dealt with by the Minister of Labour and National Service instead of the Departmental Minister concerned. The contractor must recognise the freedom of his employees to be members of trade unions.

Quality Control

An informal meeting of the Industrial Applications Group of the Royal Statistical Society is to be held on Friday next, December 18th (at 6.30 p.m.) at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, Victoria Embankment, W.C.2, when a discussion on " The Relation between Design Tolerances and ' Control Limits ' in Manufacture " is to be opened by Dr. B. P. Dudding, M.B.E. Contributions drawn from recent experience in the application of quality control to wartime manufacture will be made by Mr. W. J. Jennett, B.Sc., and by Mr. H. Rissik, A.M.I.E.E. In view of the widespread interest in this subject members of the Institutions of Mechanical, Electrical, and Production Engineers, and the Institute of Engineering Inspection, have been invited to attend and the invitation is extended to all engineers interested in the application of statistical methods to the control of product quality during manufacture.

Fuel Waste Summons

In a case of alleged waste of electricity heard at Penzance Police Court, Arthur Melhuish pleaded guilty on behalf of his wife. He contended, however, that it was not a question of wasting electricity ; they left the electric fire on while they went to the pictures so that the cottage would be warm on their return. There was no coal-fire burning on those occasions and he considered it would have been greater waste of fuel to have left a banked-up coal fire. The electric fire consumed only one unit per hour. Pointing to the eight gas jets burning in the Guildhall he said, " Look what you are burning here." The case was dismissed under the Probation of Offenders Act.

Action Against J.E.A.

In the King's Bench Division last week Lord Justice Hilbery concluded the hearing of an action by Mr. John Henry Lee, now residing at Warren Cottage, Warren Mead, Sutton, Surrey, against the London and Home Counties Joint Electricity Authority, to recover damages for alleged negligence arising out of an accident on May 13th, 1941, at a house at which he then resided at Thrigly Road, Chessington.

The case for the plaintiff was that his infant son aged fourteen months had died from electric shock as a result of defendants' negligence.

It appeared that in the sitting-room of the house at Chessington there was a cupboard in which was a meter and the supplier's and consumer's fuse boxes. In the course of playing the child got into the cupboard and when the mother came into the room and looked in the cupboard she found the child's left hand on a part of the apparatus, the cover of the box being off. When she lifted him up she found he was dead. Both covers of the fuse boxes were alleged to be off, and plaintiff said he had complained about it. He contended that the accident was the result of the negligence of the defendants.

Defendants denied negligence and that the child's death was due to any default on their part. They also denied that plaintiff had ever made any complaint to them.

After hearing the evidence his Lordship gave judgment for the defendants, holding that the plaintiff had failed to make out the allegation that the apparatus was ineffectively secured and that the liability rested upon the defendants.

Overcharge for Second-hand Vacuum Cleaner

A house furnishing firm, which pleaded guilty to selling a second-hand vacuum cleaner at £6 when the original price was in the region of £5, was charged under the Goods and Services (Price Control) Act at Edinburgh Sheriff Court on December 4th, and admonished by Sheriff Jameson.

It was stated that the manager of the vacuum cleaner company saw the machine in the shop window and bought it, and reported the matter to the Price Control Committee. An agent said there was no attempt to mislead or defraud the public. The machine was exposed for sale with the price clearly marked. The firm had taken the most careful steps to ascertain a reasonable price. The Sheriff said that it was not a matter of a reasonable price ; sellers were not allowed to charge more for a second-hand article than it cost originally. The agent explained that the firm could not find out the first-hand price from the manufacturers, and dealers told them the price was £6. The firm had paid £4 for the machine, and had expended 7s. on new parts and repairs.

Inverness Engineers' Salaries

The National Arbitration Tribunal has issued its award (No. 279) in the matter of the rates of salary paid to a distribution superintendent and a station superintendent employed by the Inverness Town Council.

Action on behalf of the two engineers was taken by the Electrical Power Engineers' Association under the Conditions of Employment and National Arbitration Order, 1940, reporting the existence of a " trade dispute " to the Minister of Labour and National Service who referred the matter to the Tribunal. The engineers, described in the Award as " workmen," claimed that they should be paid the rates of salary and enjoy the conditions of service laid down in the agreements made by the National Joint Board for the Electricity Supply Industry.

Evidence was given regarding these agreements (it being stated that the Council was not a member of the appropriate District Joint Board); as to the rates of salary and war bonus paid to the applicants and their duties, with reference to their correct grading; and as to the present remuneration by the Council of other

members of the technical staff in the electricity undertaking, at rates not less than the N.J.B. rates.

After hearing the statements of the parties, the Tribunal found that the dispute remaining at the time of the hearing proved to be a difference between the parties as to whether the two employees should be paid the rates appropriate under the N.J.B. scheme to Grade 3 employees after their fourth year of service, as was claimed by the members of the Association, or at not less than the rates appropriate to Grade 5 employees " as they are and have for some time been paid by the Council." On this issue the Tribunal found in favour of the claimants and awarded accordingly, the award to take effect as from October 12th, 1942.

" De-gaussing " in Sweden

The Stockholm correspondent of *The Times* says that Swedish naval experts claim that they have virtually solved the problem of protection of shipping against magnetic mines. A demagnetisation station has been opened outside Stockholm, where all Swedish merchant ships are offered " electrical massage " by passing through a high-voltage field. It is claimed that this, added to the wiring of the outside of the hull, gives complete protection against magnetic mines 30 ft. underneath the keel or more. Complete demagnetisation of the great iron mass involved is impracticable. Similar stations have been planned on the south and west coasts.

Women Engineers' Wages

At a meeting in London last week between representatives of the Engineering and Allied Employers' Federation, the Transport and General Workers' Union and the Union of General and Municipal Workers agreement was reached on the payment of women engaged in the engineering industry.

It is provided that the national bonus shall be increased from 18s. to 22s. for the 47-hour week and that women of 21 and over on plain time work shall receive an additional 3s. per week with proportionate additions for those between 18 and 21 and younger girls. The increases will take effect as from December 21st.

The meeting also approved a scheme for grading women according to the nature of their work, account being taken of cases in which they replace men and of special rates and bonuses. The approval of other trade unions concerned will have to be obtained before this scheme is instituted.

Wages in the Cable Making Industry

The Joint Industrial Council for the Electrical Cable Making Industry announces that the cost-of-living figure on October 31st (100 points above the 1914 level) will not involve any alteration in wages on the third pay-day in December.

Fatality

A verdict of " Death from Misadventure " was returned at the resumed inquest at a West of England camp last week on L/Cpl. H. Hudson, of the Grenadier Guards, who died from electric shock when he took hold of a door handle connected to the mains. The Wiltshire coroner said that death was the result of a " foolhardy prank," and suggested that whoever was responsible probably thought that the only effect would be a slight shock and stood by to " see the fun." It is reported in the *Manchester Guardian* that two Guardsmen have been charged before a court-martial with conduct prejudicial to military discipline, and the findings of the Court are to be made known.

Fostering Trade with Brazil

The registration is announced of the Brazilian Chamber of Commerce and Economic Affairs in Great Britain, with the object of promoting and extending the trade and economic relations between Brazil and the United Kingdom; to promote their industries and the exploitation of their natural resources; to study economic affairs having regard to their fundamental importance in international trade; to keep members informed of trade openings and trade duties, etc.

Among the concerns associated with the registration are the Metropolitan-Vickers Electrical Co., Ltd., the English Electric Co., Ltd., the Brazilian Traction, Light & Power Co., Ltd., Cable & Wireless, Ltd., and John I. Thornycroft & Co., Ltd.

Export Control

Under the Export of Goods (Control) (No. 44) Order, 1942 (S.R. & O. 1942 No. 2440, price 1d.), which comes into force on December 21st, control is extended to cover all types of electric filament lamps and parts thereof.

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be entered within a month from December 2nd :—

LEWCEL and LEWON. Nos. 620584 and 620585 respectively. Class 9. Wire for electrical purposes. London Electric Wire Co. & Smiths, Ltd., 24, Queen Anne's Gate, Westminster, S.W.1.

DIJELL. No. 619730. Class 17. Electrical insulating compositions. Astor Boisselier & Lawrence, Ltd., 69–70, Mark Lane, London, E.C.3.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following :—

EGA-KUT stocks and dies.

Education in Russia

Technical Training Facilities

By G. Mather, B.Sc.Tech., A.M.I.E.E.

AS a result of electrification, the U.S.S.R has been able to develop its industry at an unprecedented rate. More than four-fifths of the mechanical equipment of the entire national industry is operated by electric power and electricity is playing an increasing role in agriculture also. Considering, therefore, as an approximate index of industrial expansion, that the Third Five-Year Plan visualised more than a doubling of the annual energy output, by 1942, to the level of 75,000 million kWh, the need for the technical training of a commensurate personnel becomes apparent. This object has been attained by close co-ordination between the basic educational system and the electrical industry.

The interest taken in post-war technical education in this country has been demonstrated by recent I.E.E. and A.S.E.E. papers on the subject. The author considers that in planning for the future we should study what has been achieved in the "greatest social laboratory in history."

Opportunities are given to each individual to obtain the education he desires. Education is free until the age of fifteen; thereafter fees (which are higher in larger cities) depend on the course taken. About 96 per cent. of the total cost is borne by the State, the remainder being contributed by payments within the means of the average worker. Students from families with low incomes, and orphans, are excused their fees, and receive a maintenance grant if they have the required standard of education. Primarily, absence of desire or aptitude and not of means governs the extent of an individual's education. The ultimate object is that "the man behind the lathe shall know his differential calculus."

The young engineer will finish a continuous primary and secondary education in the "ten-year school" at the age of eighteen at the latest, but he may decide upon other alternatives when he is fifteen, depending on what he feels himself fitted to be. One alternative is to undertake a two years' course at an Industrial Training School where tuition is free and maintenance and clothes are provided by the State. Such schools train skilled mechanics, metallurgists, chemists and mine, oilfield, railway, and water transport workers.

The employment of such trainees is directed by the Council of People's Commissars, who sanction their assignment to the various industries. On completion of their course the students are required to work in the appropriate industry for four years, during which time they are exempt from military service, but subsequently, should they so desire, they may undergo training for any other profession.

The system was introduced in order to create reserves of labour for certain industries likely to experience serious shortage. Other industries already had their own Factory Training Schools, and there were in addition "Technicums" for the training of an intermediate grade of specialists as well as supervisors and foremen. For the latter, the course, open to the pupil leaving school at fifteen, lasts from three to five years, of which the first two are devoted to general education. The fees are the same as if the student had continued his secondary education (probably equivalent to about £5 or £6 a year), and they are remitted if he obtains the mark of "excellent" in two-thirds of his subjects and "good" in the rest.

In the Factory Training School, the pupil, having remained at school until he is sixteen, takes a six months' course fitting him to work at a trade in a particular factory. The status of such schools is held to be equal to that of the secondary school.

Industrial schools are attached to particular factories and have their own classrooms, workshops and laboratories. The pupil is taught the applied science of the industry by trained engineers and performs practical work in the factory under the supervision of skilled craftsmen. For such work he is assigned a standard rate of pay for trainees, of which he receives a third. One-third goes to the factory and the other to the Government.

The working day in the schools lasts seven hours, of which two are devoted to general education and the rest to subjects connected with the industry. A typical curriculum for heavy industry would include a general survey of its technology and the organisation of production; accident prevention and safety appliances; principal properties of materials; structure, operation and care of machines and tools; functioning and operation of interconnected machines; elementary principles concerning standards of work; and wages and production costs. Social science and the Russian language and literature are compulsory for a year. A foreign language (and there is a rapid trend towards English) may also be included.

A curriculum is first issued in draft form by a commission of the appropriate central

authority. Teachers then have the opportunity of criticism before it is returned to the commission for those amendments to which they agree. This allows flexibility for local conditions as viewed by the teacher, before the curriculum is issued in its final form, when it becomes obligatory for all schools.

The Commissariat of Education is the central authority for each republic, but on the All-Union Council of People's Commissars is the Commission for Higher Education, concerned with its more academic aspects, and exercising a directive and supervisory function regarding the higher branches of specialisation in all professions. For these, university standards are required.

While the Universities are State-administered, the Higher Technical Institutes are organised under the responsibility of the various Commissariats whose industries they are intended to serve. Thus the Commissariat for the Electrical Industry and Electric Power Stations deals with "heavy" engineering, including traction, while that for Transport also deals with certain aspects of traction. The Commissariat for Communications controls the principal field for "light" electrical engineering and that of the Defence Industries covers optical and X-ray apparatus. Any overlapping of their work is obviated by all plans and curricula having to be submitted, for co-ordination, to the Commission for Higher Education.

A pupil finishing at the "ten-year school" may enter a Higher Technical Institute on passing the entrance examination. This is waived if he had a leaving record of "excellent." The course lasts five years, of which the first two are devoted to general education, including physics, chemistry, and political history and philosophy. The third and fourth years tend to greater technical specialisation, while the fifth is very specialised, and on the "heavy" side may include traction, applications of machinery to industry, electrical machine design, optical applications and measurements, as well as a foreign language in which the student must be able to read technical literature.

Oral Examinations

Examinations are all oral. The students are examined in the presence of their lecturer and two or three members of a State Commission by a person who has had contact with them. After each student has received a question he is allowed about twenty minutes to think and then is expected to give an exposition, lasting from five to ten minutes, with the aid of a blackboard. The Diploma is not awarded on the sole basis of the examination. During the fifth year the student undertakes a "Diploma Project," that is, the design of a transmission line or a motor or some piece of research for which a six-month period is allowed. The student must hand in a finished job, the quality of which will decide his diploma.

About half way through the fifth year, students are assigned to various industries for two periods of six weeks each when they attend lectures in the factory. After completing their course they are expected to work for two years in a factory in recognition of the State's major contribution to their education. They receive standard rates of pay.

A further training is open to those wishing to take up research work or lecturerships. The person undertaking the required course of three years is known as an "aspirant." He is assigned to a professor who gives him individual guidance and indicates the general line of his study, while he also has a consultant in each of his subjects.

Nature of Syllabus

A representative syllabus would include:—(1) mathematics — theory of complex variables, partial differential equations, vector algebra, vector calculus; (2) physics — theory of magnetisation, electronic theory; (3) a foreign language; (4) social science and philosophy; and (5) two special subjects such as (*a*) surges on transmission lines and transformers, and (*b*) theory and calculation of magnetic fields with applied vector calculus.

Each examination is held in the presence of the Dean of the Faculty, the professor and the consultant in that subject. The aspirant may take each subject as he feels disposed within a specified four-week period. In addition he must present a thesis on some piece of research selected from a range of subjects prescribed by the social needs of the country. An official opponent is appointed to a given paper, on the important portions of which the aspirant will give about an hour's lecture with the aid of films. The opponent then delivers his criticisms, to which the aspirant must reply. If the thesis is judged to conform to the requirements of the Commission for Higher Education and the aspirant has satisfied the other examinations he becomes a "Candidate of Science."

In 1940 those enrolled in technical schools numbered 384,000, and for industrial courses in the higher technical institutes, 38,900. Such students undertake their training in the full confidence of being appointed to suitable posts afterwards.

Proposals for technical training and education in our own country after the war cannot be dissociated from the form of national organisation that we consider necessary. If we want an improved and extended system of engineering education to be utilised and not to assist in creating a basis for "technological unemployment" it would be bigotry not to study the results, as regards quantity, quality and utilisation, achieved in what might be considered as the greatest social laboratory in history.

Switchgear Installation

German Economy Measures

IN view of the shortage of essential materials and of the need to accelerate the construction of switchgear, we give below an abstract from an article translated from the "Bulletin Schweizerische Elektrotechnische Verein" which quotes, from *Elektrizitätswirtschaft*, an official order made in Germany on June 4th last, relating to new switchgear.

Voltage and current ratings are not to be higher than operating conditions require. Rupturing capacity is to correspond with the actual short-circuit power, which (especially in systems up to 30 kV) is to be restricted by such means as division of load and the use of reactors. In each case probable developments during the next four years may be taken into account.

Switchrooms may be built only where switching is not done at the apparatus. Remote-control and load-distribution systems are forbidden if reliable operation is possible by simpler means. Relay rooms are not permissible and the relays must be placed near instrument transformers in order to economise in auxiliary cables.

Installations for 60-kV and upwards must be economical of steel and be of outdoor construction, except where atmospheric pollution or air-raid precautions demand indoor types, Transformers of 5 MVA and upwards must be installed out of doors, except where atmospheric conditions are adverse or the cost of splinter protection would be greater than that of a building.

Busbar Reduction

Metal-clad systems may be erected only if open construction is prohibited for operation reasons or costs more. The number of busbars is to be the minimum needed for operating conditions at the time. Further segregation can be obtained by longitudinal separation of the busbars and corresponding grouping of the branches. Anticipated extensions of busbars may be taken into consideration. Flat busbars must be designed only for prevailing current loadings and mechanical stresses, but consideration may be given to the future addition of single busbars. Cross-sections must be graded in accordance with load conditions, and for heavy AC loads the use of U-profile or tubular busbars is recommended.

Current and voltage transformers must comply with the standard specification (V.D.E.0414). Instruments for control purposes may not be employed, but room may be provided for their later incorporation. The use of recording instruments, voltage transformers and current transformers is to be restricted as much as possible.

The number of protective devices employed hitherto can usually be reduced to one half as a war measure. Locally controlled mechanisms for operating isolators and circuit-breakers may be used only when manual operation is impracticable. Remote-controlled mechanisms are allowed only for generators, for switching points where synchronising is necessary and for high-voltage motors that cannot be controlled *in situ*. Electrical and mechanical interlocking must be minimised.

Earthing Methods

In closed operating rooms, doors and protective coverings are permissible only on the service side. Cables may be used for connecting indoor switch-cubicles to machines and transformers only when bare conductors would not save material. The iron framework must constitute the earthing system where practicable, thus eliminating special earth leads (*cf.* V.D.E.0141).

Circuit diagrams and designations are to be in colour. Separate indicating and signalling devices are to be dispensed with when the apparatus to be operated is in direct view. Leads for control metering on switchboards are to be of aluminium ; their cross-sections should be related to mechanical stress, especially where vibration is continuous. Coloured insulated auxiliary leads will not be allowed. Connecting wires and terminal markings must comply with V.D.E. 709/719.

Reserve cubicles that come into operation during the next four years may be designed for the later accommodation of apparatus, iron parts and partitions. Busbars may, however, be laid over them. Apparatus in unused cubicles is to be transferred to other plants; the use of transport rails is to be minimised. Apparatus painted with one coat may be given a further single coating only after erection, except where corrosion risk exists ; facing or filling is forbidden.

Philips Works Bombed

ON Sunday last squadrons of light aircraft of Bomber Command attacked the Philips works at Eindhoven, Holland. The works, which is about 60 miles from the coast, is well defended, but the attackers went in at low level and set fire to lamp and valve assembly plant, the section which produces rare gases for lamps and valves and an electro-technical department. Eindhoven employs over 15,000 people, and practically the whole of its output of important war products is now being taken to Germany.

ELECTRICITY SUPPLY

Belfast Contract. Activity in Trinidad.

Banbury.—SUBSTATION.—The Rural District Council has approved the establishment of a substation on a Council housing estate by the S.W.S. Power Co.

Belfast.—COUNCIL AND ADMINISTRATORS.—Declaring that the system of holding Council meetings was a "complete farce," Councillor W. M. Wilton recently cited a case in which the Electricity Committee had met to consider the provision of additional supplies to a city firm when the Administrators had already approved the proposal four days previously, and had actually accepted quotations to the extent of £45,000 without any tenders. Councillor S. B. Thompson, chairman of the Electricity Committee, said that Councillor Wilton's statement was correct, but the circumstances were exceptional. The Committee would not approve of the Corporation having to meet the expenditure; it was a Government matter.

Colchester.—ELECTRICITY ECONOMY.—At a Fuel Economy Exhibition held recently in the town it was reported that despite increased demands a saving in electricity was being made. In August there was a reduction in consumption of 4·2 per cent. compared with the corresponding month of last year. In September the decrease was 16·6 per cent. and in October 8·33 per cent.

Falkirk.—NEW PLANT.—The Electricity Committee is applying for permission to install additional plant.

Hull.—SCHOOL SHELTER INSTALLATIONS.—The Education Committee is to install electric lighting and heating in more school shelters at a cost of £1,407.

London.—SHELTER LIGHTING ECONOMY.—In view of public protests regarding waste of electricity the Wandsworth Council recently asked the Government whether the traffic warning lights on air-raid shelters should be extinguished altogether, the corners of the shelters being painted black and white, or if the appropriate Ministry would agreed to the installation of automatic control. As no reply has been received the Civil Defence Committee has approved a scheme for transferring time switches from street lamps to 600 shelters concerned at a cost of £460. It is estimated that 157,680 kWh will be saved annually and there will be a financial saving of about £500.

CABLE-LAYING.—Wandsworth Borough Council has approved proposals of the County of London Electric Supply Co., Ltd., for the laying of cables in Merton Road, Southfield and in Mitcham Lane, Streatham.

Overseas

Spain.—WATER POWER RESTRICTIONS.—A *Reuter* message from Madrid states that most of the hydro-electric concerns in the Province of the Asturias are suspending their supply for ten hours each day in compliance with restrictions imposed because of the severe drought.

Trinidad.—BOARD'S REPORT.—Mr. W. J. Williams, general manager of the Trinidad Electricity Board, in his report for 1941, says that the period was one of exceptional developments in the use of electricity for domestic and industrial purposes, as well as in road passenger transport. The generating plant installed in 1939 became fully loaded, and extensions had to be considered on a much larger scale. Pending the installation of new plant, and in view of the rapidly increasing demands for defence purposes, a rationing system was introduced, the extreme limit of the power station's capacity having been reached. Altogether 11·9 million kWh was sold last year compared with 8·5 million kWh in 1940 and only 4·6 million kWh in 1938, the first full year of the Board's operation. It is hoped to publish a fuller summary of the report next week.

TRANSPORT

Liverpool.—CONCRETE SLEEPERS.—An experiment is being made in the use of concrete instead of wooden sleepers for enclosed tram tracks. According to the *Passenger Transport Journal*, the Government has suggested that this type should be used on a new length of track, and before doing so the City Engineer's Department, which is responsible for tramway maintenance, is putting a number of such sleepers into the enclosed track at Aigburth Road.

South Shields.—TROLLEY-BUS SERVICE WITHDRAWN.—In order to save rubber and fuel, the Town Council has agreed to stop running trolley-buses along Ocean Road and the route will be served in future by trams from Fowler Street to the Pier Head.

RADIO & TELEPHONY

Bournemouth.—RADIO AT DEPOTS.—The Emergency Committee is to make inquiries regarding the purchase price and hire-purchase terms for radio sets for depots.

Hull.—RELAY SERVICE AT SCHOOLS.—The Education Committee has agreed to the provision of broadcast relay services at schools at a cost of £112 10s., plus £45 18s. 6d. annual rental.

Leeds.—TELEPHONE IMPROVEMENTS.—The *Yorkshire Post* reports that plans are being prepared for replacing with the most up-to-date equipment the automatic telephone exchange, installed during the last war, which serves the centre of Leeds. When this is done, in 1944 or 1945, the project which was started in 1938 to give Leeds a telephone system ahead of any in the country will be completed. A meter will register calls which a subscriber has had within the 15-mile radius, allowing for the different charges as the distance increases.

Portugal.—TELEGRAPH SERVICE TO BRAZIL.—A new telegraph service between Portugal and Brazil has been inaugurated by the Portuguese Marconi Telegraph Company, according to a *Reuter* message from Lisbon. The rates have been reduced from 27 to 5.40 escudos per word.

Workmen's Compensation

Supersession of Present System Proposed

AN important section of Sir William Beveridge's report on Social Insurance and Allied Services (Stationery Office, Cmd. 6404, price 2s.), to which brief reference is made in a leaderette, is that in which he proposes that the present scheme of workmen's compensation shall be superseded and provision made in the unified insurance plan for industrial accidents or diseases.

In a review of the existing system, Sir William acknowledges that this system has conferred great benefits in the past and, generally speaking, has operated to the satisfaction of both employers and workers. The conclusion that the system should be superseded in a unified plan for social security rests not on a denial of any good in it, but on the possibility of replacing it by a better system.

Drawbacks of Existing Arrangements

Briefly stated, the disadvantages of present methods are the possibility of litigation which sets up a risk of contention between the parties and involves heavy expenses ; the worker suspects that pressure is put upon him to reduce his claim or accept an inadequate lump sum ; that there is no complete security for the payment of compensation ; that the receipt by the workman of a lump sum fails to ensure him an income ; that disputes as to liability for accidents arise ; that there are differences of principle in defining dependants from that adopted for unemployment insurance and contributory pensions ; that the costs of administration are high ; that difficulties arise in fixing the liability for industrial diseases where a man has had a number of employers ; and that little or nothing is done to restore the injured employee to the greatest possible degree of production and earning.

It is recognised that there must be some differentiation between industrial accidents and disease and other causes of disability and death. After exhaustive consideration of this aspect, Sir William comes to the conclusion that the risks should be pooled in part and met by the general insurance contribution and in part kept separate and placed upon employers in order to give a definite financial incentive for prevention of accident and disease in such industries as present a need for special precautions. Several industries are suggested for this special treatment, including mining, docks, railways, metal extraction and shipbuilding, but this is recognised to be a matter for further inquiry.

It is proposed that in these industries there should be a levy on employers of two-thirds of the excess cost above the normal. Another suggestion is that in every scheduled industry there should be set up a statutory association of employers and employees to promote safety measures and advise on regulations for the industry, to promote measures for rehabilitation and re-employment, to collect from employers their quotas of the industry's total levy and to establish schemes to supplement the statutory benefits.

The report says that the amount of compensation compares unfavourably with that paid in some other countries. It is fixed at half the average earnings lost subject to a maximum of 30s. per week plus a flat rate addition of 5s. and allowances for young children. Following the practice of Belgium, British Columbia, Ontario, Germany, Italy, Sweden and American States, it is proposed that the rate of industrial pension shall be two-thirds of the lost earnings, subject to a maximum provisionally fixed at £3 a week and to a minimum not less than would have been received as disability benefit. The new rates would apply to existing cases but lump sum settlements would not be affected.

As to methods of payment, two alternative methods are suggested :—(a) that the existing payment should continue to be provided as at present by the insurance companies with the Social Insurance Fund giving the additions involved in the new scale ; and (b) that the Social Insurance Fund should take over the whole responsibility, making a single payment to the employee at the new rates. In the latter case the Fund would have to take over moneys set aside by insurance companies, mutual indemnity associations and individual employers for meeting such liabilities.

E.P.E.A. Subscriptions

THE National Executive Council of the Electrical Power Engineers' Association has decided that members in Hong Kong, Singapore, Kuala Lumpur and Perak, which are at present in Japanese hands, shall be deemed to be " in benefit " for the year 1943.

At the same meeting of the Council a letter was read from Mr. P. A. Dowman (Cork), a former member of the Council, in which he suggested that although " the writ of the Association no longer runs in Eire " those who have been associated with it for many years are reluctant to sever their connection, but think that they should be granted a reduced subscription. It was agreed that for the year 1943 members in Eire should be deemed to be members of the Foreign, Colonial & Marine Section and pay the appropriate subscription, £2 per annum.

It was also decided to reduce the subscriptions of retired members in Classes B and C.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crompton Parkinson, Ltd., announce that the profit for the past year was £410,498, as compared with £391,404, after providing for depreciation and taxation. It is proposed to maintain the final dividend of 7½ per cent. on the ordinary and " A " ordinary stock, again making 15 per cent. for the year. In addition the special cash bonus of 5 per cent. upon both classes of stock is repeated. A sum of £5,000 is transferred to the central benevolent fund, as last year, and a balance of £389,744 is carried forward.

The British Electric Transformer Co., Ltd. (which is controlled by Crompton Parkinson, Ltd.) states that its profit advanced from £18,387 to £41,325 for 1941-42. The ordinary dividend is maintained at 7½ per cent. by a final payment of 2½ per cent. The carry-forward is £8,256.

Drake & Gorham, Ltd., report a profit for the year ended June 30th of £65,686, as compared with £57,999 for 1940-41. The net profit is £12,383 (against £10,237), and the dividend for the year is again 5 per cent. The balance carried forward is £12,894 (against £6,761 brought in).

Ensign Lamps, Ltd., reports a net profit for the year to June 30th of £50,415, as compared with £44,855 for the preceding year. Tax requires £40,000, and the final dividend is 15 per cent., maintaining the distribution for the year at 25 per cent. The balance carried forward is £4,043 (against £3,003 brought in).

Electric & Musical Industries, Ltd., reports a total income of £245,464 for the year ended September 30th, as compared with £215,106 for the previous year. Expenses totalled £87,504, and directors' fees were £4,400, leaving a profit of £153,560 (against £126,581). The ordinary dividend for the year is maintained at 6 per cent., less tax, and the balance carried forward is £247,554 (against £194,830 brought in).

Scophony, Ltd., has issued its accounts for each of the two years to March 31st, 1941 and 1942. These show that in 1940-41 there was a net loss of £16,271, making a debit of £25,330 with £9,059 brought in. For 1941-42 there was a net profit of £8,540, reducing the debit balance to £16,790. Special privileges are proposed for the 100 ordinary shares remaining unissued. They are to be designated " A " ordinary shares and will entitle the registered holder to receive by way of dividend in any year the equivalent in amount to the dividend paid on 840 ordinary shares.

In his review Sir M. Bonham Carter (chairman) stated that they were called upon to repay the debenture debt of £19,000 owing by the company. This they were only able to do through the assistance of Mr. W. G. Elcock, who took over the debt and supplied the company with further resources to meet certain pressing liabilities and also to provide some working capital. For this assistance Mr. Elcock was appointed financial controller to supervise the production business for ten years and for his services would receive a percentage of the net profit earned by the company. All the 100 " A " ordinary shares would be allotted to Mr. Elcock, credited as fully paid. They had concluded an agreement for the formation of a company in the United States for the exploitation of the company's patents and processes. The agreement had been made jointly with the General Precision Equipment Corporation and with Television Productions, Inc., a subsidiary of Paramount Pictures Corporation. To provide funds for this development the company entered into agreement under which £22,500 was provided, repayable out of moneys to be received from the exploitation of the company's system in the United States. Repayment of this loan was a first charge on any royalties or dividends.

Tube Investments, Ltd., reports that the works of the group were employed to full capacity during the last year. The net earnings were £612,559 (against £610,422) and the ordinary dividend is maintained at 20 per cent. The reserve fund receives £100,000 and a similar amount is put to the war contingencies reserve.

Dictograph Telephones, Ltd., are paying a final dividend of 6 per cent., raising the year's distribution from 8 to 10 per cent. The net profit, after meeting fees, taxation, etc., was £15,754, against £16,660. The contribution to general reserve is increased from £2,500 to £5,000 and £500 (against nil) is transferred to employees' fund. A sum of £5,000 was put to war reserve last year.

Joseph Lucas, Ltd., report a trading profit of £315,132 (against £286,703) after meeting taxation, war damage insurance, etc. The final ordinary dividend is 12½ per cent., maintaining the year's distribution at 15 per cent., and £100,000 is put to reserve and £15,000 to workpeople's funds as last year.

The Sun Electrical Co., Ltd., is paying a first and final dividend of 2½ per cent: (unchanged).

The Electric & General Investment Co., Ltd., has declared an interim dividend of 2½ per cent.

Max Stone, Ltd., announce the payment of a dividend of 10 per cent. for the past year (same).

Sydney S. Bird & Sons, Ltd., are again paying a dividend of 30 per cent. for the year.

W. & T. Avery, Ltd., are again paying an interim dividend of 5 per cent.

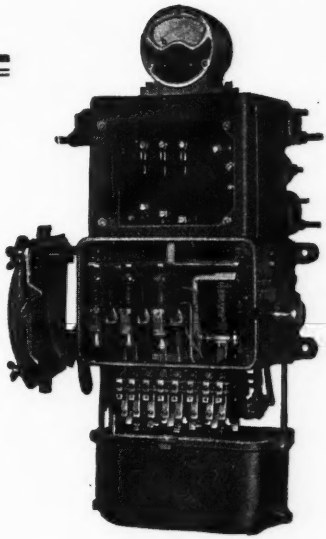
The Colombo Electric Tramways & Lighting Co.—The directors of the United Planters' Co. of Ceylon have been informed that the Colombo Municipality has given notice of its intention to exercise the option which it holds under the concession to acquire the tramway undertaking of the Colombo Electric Tramways & Lighting Co. (a subsidiary of the United Planters' Co.) as from November 26th, 1943. The purchase price will be the subject of negotiation between the Municipality and the company.

The Oriental Telephone & Electric Co., Ltd., held meetings of the preference and ordinary shareholders on December 4th at which resolutions were passed providing for the reduction

CONTROL

Immediate Despatch

Up to 50 H.P., 400/440 VOLTS



Oil Immersed Star-Delta Starter

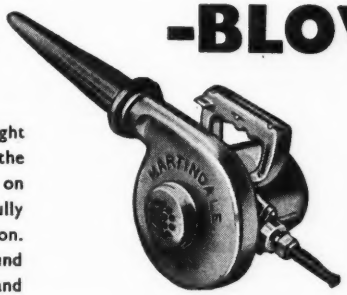
VERITYS LTD.

ASTON, BIRMINGHAM 6

Sales Headquarters :
BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2

MARTINDALE

"SUPER -BLOWERS"



The most efficient lightweight portable blowers ever put on the market. Precision-built, on interchangeable lines, carefully balanced to eliminate vibration. Armatures and coils hand-wound and impregnated to withstand all conditions of service all over the world.

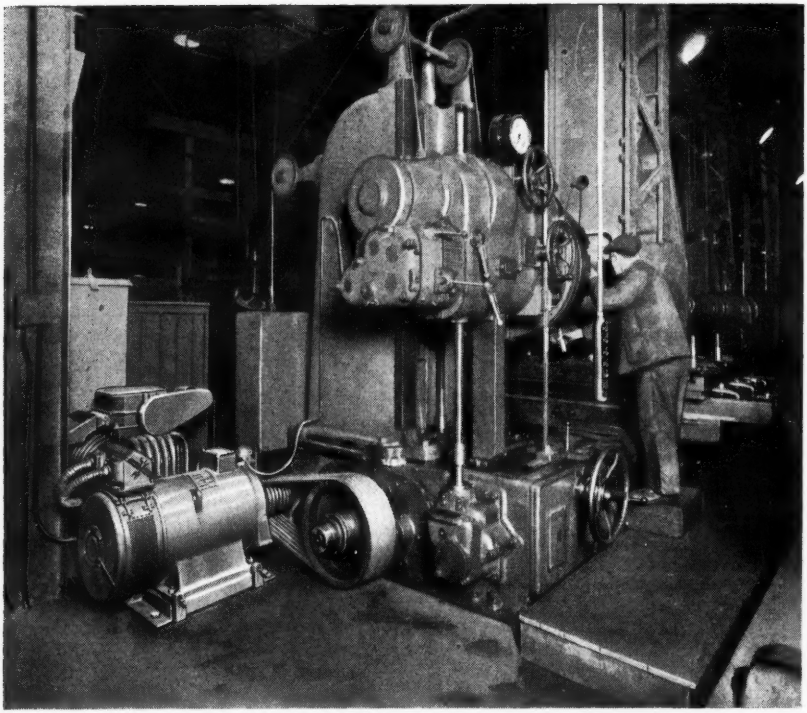
Write for literature.

Three models (1) "Mill-type"
(2) Standard
(3) "Blower-Clean"

All models can be instantly converted into powerful industrial vacuum cleaners.

MARTINDALE ELECTRIC CO. LTD., Westmorland Road, LONDON, N.W.9

Telephone : Colindale 8642-3 *Telegrams : Commstones, Hyde, London*



"N-S"—THE A.C. MOTOR FOR ALL VARIABLE SPEED DRIVES

THE "N-S" is outstanding among variable speed A.C. commutator motors. It is free from complicated moving brushgear, and has perfect commutation at all loads and speeds and consequently long brush life. It is started by direct switching and is protected by normal overload protection as for an ordinary induction motor. It is made for outputs up to about 500 H.P. ; voltages up to 6,600 ; and in a complete range of enclosures including "Emcol" totally enclosed. "N-S" motors are giving very satisfactory service on many kinds of variable speed drives.

A 30/10 H.P. 1450/480 R.P.M. "N-S" motor, arranged for full push-button control, driving Richards Universal Horizontal Boring Machine.

LAURENCE, SCOTT & ELECTROMOTORS LTD.

SPECIALIST MAKERS OF ELECTRIC MOTORS FOR NEARLY SIXTY YEARS

NORWICH, MANCHESTER, LONDON & BRANCHES

of the capital from £900,000 to £600,000 in £1 ordinary shares. The ordinary shareholders are to receive a cash distribution of 20s. per share and the preference shares are to be repaid at 24s. and cancelled.

The Barbados Electric Supply Corporation, Ltd., reports a trading profit for the year to June 30th of £17,344, as compared with £17,407 for the previous year, and after placing £9,500 to tax reserve, a net profit of £7,844 (against £7,907). The first and final dividend is 5 per cent., tax free (same), and £2,926 is carried forward (against £3,082 brought in).

The British Columbia Power Corporation is paying a dividend of 50 cents on the class "A" shares for the quarter to December 31st.

The East African Power & Lighting Co., Ltd., has announced an interim ordinary dividend of 3 per cent. (same).

Lisbon Electric Tramways, Ltd., is again paying an interim dividend of 2½ per cent., free of tax.

New Companies

De La Rue Plastics, Ltd.—Private company. Registered November 28th. Nominal capital, £1,000,000 in 1,000,000 shares of £1 each. Objects: To acquire all that branch or part of the business of Thomas De La Rue & Co., Ltd., which comprises the manufacture of, and dealing in, plastics, and articles made therefrom and therewith, and to carry on the business of manufacturers, producers, importers and exporters of, and dealers in, natural and synthetic plastics, plastic substances, moulding materials, mouldings, moulded goods, filling compounds, fire and acid proof materials, electrical and insulating materials, jewellery, boxes, packing cases, paints, colours, dies, etc. Subscribers: A. Bryon, 21, The Park, Ealing, W.5, and C. E. May, 26, Mashiters Walk, Romford. Solicitors: Bristows, Cooke & Carpmael, 1, Copthall Buildings, E.C.2.

Grimsby Electric Welding Co., Ltd.—Private company. Registered November 23rd. Capital, £1,000. Objects: To carry on the business of electrical and general welders, etc. Subscribers: C. Taylor, Southdowns, Humberstone Avenue, New Waltham, Grimsby and B. R. T. Hopwood, 3, Cumberland Avenue, Grimsby. Secretary: C. L. G. Major. Registered office: Murray Street, Fish Docks, Grimsby.

Sullam & Telsen Manufacturing Co., Ltd.—Private company. Registered November 27th. Capital, £1,000. Objects: To carry on the business of electricians, electrical and mechanical engineers, manufacturers of, and dealers in, torch cases, bulbs, dynamos, motors and electrical accessories, wireless and gramophone apparatus, etc. Subscribers: S. Kornfeld, 53, Broom Lane, Higher Broughton, Salford, 7, and S. D. Sullam, 72, Newman Street, London, W.1.

J. W. H. Instruments, Ltd.—Private company. Registered November 11th. Capital, £300. Objects: To carry on the business of electrical and mechanical engineers, manufacturing goldsmiths, silversmiths, etc. Directors: Lilian A. Humphrey, 60, Norman Avenue, Sanderstead, Surrey, Wm. J. Jerran, 8, Tudor Road, N.9, and F. G. Willis, 47, Spring Park Road, Shirley, Croydon.

Companies' Returns

Statements of Capital

Chloride Electrical Storage Co., Ltd.—Capital, £1,250,000 in £62,000 6 per cent. preference stock, £791,100 "A" ordinary and £297,603 "B" ordinary stock, and 99,297 unissued shares of £1 each. Return dated July 13th. £62,000 6 per cent. preference stock, £791,100 "A" ordinary stock and £297,603 "B" ordinary stock taken up. £207,200 paid. £943,503 considered as paid. Mortgages and charges: Nil.

Electric Construction Co., Ltd. — Capital, £400,000 in £1 shares (100,000 preference and 300,000 ordinary). Return dated July 30th. All shares taken up. £153,710 paid. £246,290 considered as paid. Mortgages and charges: £112,960.

Callender's Cable & Construction Co., Ltd.—Capital, £2,300,000 in £1 shares (1,500,000 ordinary, 400,000 preference and 400,000 "B" preference). Return dated July 17th (filed August 4th). 1,123,916 ordinary, 400,000 preference and 400,000 "B" preference shares taken up. £1,255,000 paid. £668,916 considered as paid. Mortgages and charges: £300,000.

Automatic Electrical Engineers, Ltd.—Capital, £500 in £1 shares. Return dated August 6th. 300 shares taken up. £300 paid. Mortgages and charges: Nil.

Electrona Electrical Products, Ltd.—Capital, £1,000 in £1 shares. Return dated October 8th, 1940 (filed August 7th, 1942). 859 shares taken up. £325 paid. £534 considered as paid. Mortgages and charges: Nil.

Shoolbred Electrical Co., Ltd.—Capital, £5,000 in 4,000 6 per cent. preference and 1,000 ordinary shares of £1. Return dated February 24th, 1941 (filed July 6th, 1942). 3,900 preference and 100 ordinary shares taken up. £3,000 paid on 2,900 preference and 100 ordinary shares. £1,000 considered as paid on 1,000 preference shares. Mortgages and charges: £7,000.

Henderson & Priestley, Ltd.—Capital, £5,000 in £1 shares. Return dated August 3rd. 2,836 shares taken up. £2,836 paid. Mortgages and charges: Nil.

Davies, Kent & Stewart, Ltd.—Capital, £3,500 in 2,500 preference and 1,000 ordinary shares of £1. Return dated December 20th, 1941 (filed August 4th, 1942). 2,057 preference and 1,000 ordinary shares taken up. £83 paid. £2,974 considered as paid. Mortgages and charges: £1,350.

Receiver Released

Tyche, Ltd.—Martin B. Browne, of 1-4, Broad Street Place, E.C.2, ceased to act as receiver on November 19th, 1942.

Bankruptcies

B. H. Auld, electrical engineer, 38, Sheen Common Drive, Richmond, Surrey, lately carrying on business and described in the Receiving Order as Bruce H. Auld & Co., of, and carrying on business at, 66, Victoria Street, London, S.W.1, engineers.—Fourth and final dividend of 3½d. in the £, payable December 23rd, at 4, Bucklersbury, London, E.C.4.

STOCKS AND SHARES

TUESDAY EVENING.

IN the Stock Exchange markets there is, as members are wont to say, more tone than trade. Business has fallen off to a considerable extent as compared with what it was in the early part of November. It cannot be said that any diminution has occurred in the amount of money available for investment, but apparently, the owners of that money prefer to await developments from the war zones before utilising it in Stock Exchange channels. Prices, however, keep steady, their firmness witnessing the ready support which takes any shares that come to market at current levels. The publication of the Beveridge Report continues to be a main topic for discussion.

The Beveridge Report

What may be the implications that arise out of this report it is yet too early to say. Falls in the shares of the Prudential and other industrial life insurance companies drew notice to the consideration that these companies, handling as they do enormous sums of money, are amongst the largest buyers of Stock Exchange securities. If the industrial life business is to be taken over by the State, as the Beveridge Report proposes, this particular support to Stock Exchange markets will be withdrawn. As a consequence, some people ask whether the effect upon industrial stocks and shares may not prove to be unfavourable. It is taken for granted, however, that the Beveridge proposals are likely to be modified and amended before they become practical politics.

Implications

Out of the confusion created by publication of the Beveridge Report, two or three factors emerge which may be expected to influence Stock Exchange prices of industrial shares. If incentive is removed, as opponents of the plan say it will be, this might argue a contraction in the spending power of the population as a whole, thereby curtailing profits of the manufacturing and equipment groups. A rise in wages is considered almost inevitable under the conditions which the report envisages, and this would logically lead sooner or later to inflation : the very thing to which modern economists are opposed.

If the foregoing considerations deserve attention, then it would seem that prices of industrial shares are in many cases too high. The fact of their being maintained at current levels is fairly conclusive evidence that investment regards the ultimate outcome of the Beveridge Report as likely to be of no special concern to industrial companies, and, also, as unlikely to affect either dividend payments or profit prospects.

Home Railway Stocks

Deduction of the interest payments due on January 1st, from prices of London Passenger Transport prior charges has made little real difference to the quotations. The " C " stock is also unchanged at 55, and the Southern Railway issues, while holding their previous firmness, attract but little public notice.

The Stock Exchange Committee has given leave to deal in £12,905,000 London Passenger Transport 3 per cent. guaranteed stock 1967–72. The nominal price is 98 middle. This stock arose out of the conversion of the Board's 4½ per cent. T.F.A. issue. Proprietors of the latter security were offered £100 new stock for £100 old, plus a cash payment of 2½ per cent. The cash represents the difference between redemption price of the old 4½ per cent. stock, and the issue price of the new. The payment will be made on January 1st on which date there will also be payable a full six months' interest, less tax, on the T.F.A. stock. Out of the £12,500,000 in issue, rather more than £9,500,000, or 76 per cent., is to be converted into new 3 per cent. guaranteed. There is a balance of about £3,000,000 stock that has not been converted; arrangements have been made for its issue at 97½ per cent.

English Electric

English Electric shares reacted to 46s. after having strengthened to 47s. on the offer which the company has made to acquire the ordinary capital of D. Napier & Sons, the aero engine makers and general engineers. The offer, as mentioned last week, is one English Electric ordinary for every five Napier ordinary shares. It remains open until the 28th of this month, and is conditional upon acceptance by holders of 75 per cent. of the Napier ordinary shares. It is thought in the market that this is likely to prove a useful move to the shareholders in both companies and to the national interest as well. Napier ordinary shares before the offer had been standing about 7s. and the immediate result was to put up the price to 9s. from which it went back a few pence.

Manufacturing & Equipment

Consolidated Signals take the lead in the list of rises secured by shares in the manufacturing and equipment market. An advance of 10s. has raised the price to 95s., this bringing it into line—from the yield standard—with Westinghouse Brakes. The latter maintain their last week's advance to 57s. 6d., and the possibility of an increase in the dividend is hinted. International Combustions have hardened to £6. Electric & Musical Industries at 17s. 6d. are 3d. lower, although the report, out last week, presents satisfactory figures. The previous dividend of 6 per cent. is repeated. Rises have occurred in Crabtree,

(*Concluded on page* 768)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend: Previous	Dividend: Last	Middle Price Dec. 8	Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Companies							
Bournemouth and Poole	12½	12½	56/6	+6d.	4	8	6
British Power and Light	6	6	28/-	..	4	5	9
City of London	7	7	31/-	+6d.	4	10	4
Clyde Valley	8	8	40/6	..	3	19	0
County of London	8	8	40/-	−1/6	4	0	0
Edmundson's:							
7% Pref.	7	7	34/-	..	4	2	4
Ord.	6	6	28/-xd	+3d.	4	5	9
Elec. Dis. Yorkshire	9	9	43/-	..	4	3	9
Elec. Fin. and Securities	12½	12½	49/-	..	5	2	1
Elec. Supply Corporation	10	10	46/-	+6d.	4	7	0
Isle of Thanet	2	Nil	14/6	..	—		
Lancs. Light and Power	7½	7½	35/6	..	4	4	6
Llanelly Elec.	5½	5½	22/6	..	4	17	9
Lond. Assoc. Electric	4½	4	23/6	..	3	8	0
London Electric	6	6	27/6	+2/-	4	7	3
London Power Red. Deb.	5	5	104½	..	4	15	7
Metropolitan E.S.	8	8	40/6	..	3	19	0
Midland Counties	8	8	40/-	..	4	0	0
Mid. Elec. Power	9	9	43/6	..	4	4	9
Newcastle Elec.	7	7	30/-	..	4	13	5
North Eastern Elec. Ordinary	7	7	32/6	..	4	6	4
7% Pref.	7	7	33/6	..	4	3	7
Northampton	10	10	47/-	..	4	5	0
Notting Hill 6% Pref. (£10)	6	Nil	8¾	..	—		
Northmet Power:							
Ordinary	7	7	38/6	−1/-	3	12	9
6% Pref.	6	6	30/-	..	4	0	0
Richmond Elec.	6	6	25/-	..	—		
Scottish Power	8	8	40/-	..	4	0	0
Southern Areas	5	5	22/-	..	4	11	0
South London	7	7	24/6	..	—		
West Devon	5	5	22/6	..	4	9	0
West Glos.	4½	3½	21/-	+6d.	3	6	8
Yorkshire Elec.	8	8	41/-	+6d.	3	18	0
Overseas Electricity Companies							
Atlas Elec.	Nil	Nil	5/3	..	—		
Calcutta Elec.	7*	7*	31/6	..	—		
Cawnpore Elec.	10	10	27/-	..	7	8	2
East African Power	7	7	29/-	+1/-	4	16	7
Jerusalem Elec.	7	5	22/6	..	4	9	0
Kalgoorlie (10/-)	7½	5	9/6	..	5	5	3
Madras Elec.	6*	4*	21/6	+1/-	—		
Montreal Power	1½	1½	26½	+1½	5	13	2
Palestine Elec. "A"	Nil	4*	32/6	..	2	9	3
Perak Hydro-elec.	6	7	11/-	−6d.	—		
Shawinigan Power	83cts.	90cts.	18	+1	—		
Tokyo Elec. 6%	6	6	21	..	—		
Victoria Falls Power	15	15	80/-	..	3	15	0
Whitehall Inv. Pref.	5	5	20/-	..	5	0	0

Company	Dividend: Previous	Dividend: Last	Middle Price Dec. 8	Rise or Fall	Yield p.c. £	s.	d.
Public Boards							
Central Electricity:							
1955–60	—	3	99	..	3	0	7
1955–75	5	5	114	..	4	7	9
1951–73	4½	4½	107xd	+1½	4	4	1
1963–93	3½	3½	102	..	3	8	8
1974–94	3½	3½	99	..	3	5	4
London Elec. Trans. Ltd.	2½	2½	96½	..	2	11	10
London & Home Counties 1955-75	4½	4½	109	..	4	2	7
Lond. Pass. Trans.:							
A	4½	4½	117½xd	+½	3	16	7
B	5	5	116½xd	+1	4	5	10
C	3	2⅞	55	..	5	4	8
West Midlands J.E.A. 1948–68	5	5	109	+1	4	11	7
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	6	6	110½	..	5	8	7
Def.	1½	1½	27	..	5	11	1
Anglo-Portuguese	8	8	23/-	..	6	19	4
Cable & Wireless:							
5½ Pref.	5½	5½	107	..	5	2	10
Ord.	4	4	75	−1½	5	6	8
Canadian Marconi $1	Nil	4cts.	6/-	..	2	16	6
Globe Tel. & Tel.:							
Ord.	8½*	5*	32/-	..	3	2	6
Pref.	6	6	27/6	..	4	7	3
Great Northern Tel.: (£10)	Nil	Nil	22	+½	—		
Inter. Tel. & Tel.	Nil	Nil	8	+2	—		
Marconi-Marine	7½	7½	31/6	..	4	15	3
Oriental Tel. Ord.	16	10	57/-	−6d.	3	10	2
Telephone Props.	6	Nil	12/9	−3d.	—		
Tele. Rentals (5/-)	10	10	10/-	..	5	0	0
Traction and Transport							
Anglo Arg. Trans.:							
First Pref. (£5)	Nil	Nil	4/-	..	—		
4% Inc.	Nil	Nil	10½	..	—		
Brit. Elec. Traction:							
Def. Ord.	45	45	1005	..	4	9	8
Pref. Ord.	8	8	170	..	4	14	2
Bristol Trams	8	10	47/3	+1/-	4	4	6
Brazil Traction	$½	$1	19½	+¾	—		
Calcutta Trams	8	5½	19/-	..	5	15	9
Cape Elec. Trams	5	5	23/-	..	4	7	0
Lancs Transport	10	10	43/9	..	4	11	4
Mexican Light:							
1st Bonds	5	5	93½	..	5	7	0
Rio 5% Bonds	5	5	101½	..	4	18	6
Southern Rly.: ..							
5% Prefd.	5	5	75	..	6	13	4
5% Pref.	5	5	110	..	4	11	0
T. Tilling	10	10	50/-	..	4	0	0
West Riding	10	10	37/6	..	5	6	8

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Dec. 8	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord. ..	7½	10	32/6	..	6 3 0
Assoc. Elec. :					
Ord.	10	10	47/6	..	4 4 0
Pref.	8	8	39/–	..	4 2 0
AutomaticTel.&El.	12½	12½	54/–	..	4 12 7
Babcock & Wilcox	11	11	47/6	–3d.	4 12 7
British Aluminium	10	10	49/–	–3d.	4 1 8
British Insul. Ord.	20	20	5	..	4 0 0
British Thermostat (5/–)	18½	18½	16/6	+3d.	5 12 1
British Vac. Cleaner (5/–)	10	15	21/3	+9d.	3 10 7
Brush Ord. (5/–) ..	Nil	6	6/6	..	4 12 4
Callender's ..	15	15	76/6	..	3 18 4
ChlorideElec.Storage	15	15	76/3	..	3 18 9
Cole, E. K. (5/–) ..	Nil	7	14/6	..	2 8 4
Consolidated Signal	17	17	95/–	+10/–	3 11 9
Crabtree (10/–) ..	17½	17½	36/–	+1/–	4 17 3
Crompton Parkinson Ord. (5/–) ..	30	20	24/–	..	4 3 4
E.M.I. (10/–) ..	6	6	17/6	–3d.	3 8 7
Elec. Construction	10	10	37/6	+1/3	5 6 8
Enfield Cable Ord.	12½	12½	58/6	..	4 5 7
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric ..	10	10	46/6	..	4 6 0
Ensign Lamps(5/–)	25	25	18/–	..	6 18 10
Ericsson Tel. (5/–)	22*	20*	42/6	..	2 7 0
Ever Ready (5/–)	40	40	35/6	..	5 12 8
Falk Stadelmann	7½	7½	25/–	..	6 0 0
Ferranti Pref. ..	7	7	28/9	+1/6	4 17 5
G.E.C. :					
Pref.	6½	6½	33/3xd	..	3 18 4
Ord.	20	17½	86/6	–1/–	4 1 0
Greenwood & Batley	15	15	35/–	..	8 11 6
HallTelephone(10/–)	10	12½	22/9	+1/–	5 10 0
Henley's (5/–) ..	20	20	23/9	..	4 4 2
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	15	54/6	..	5 10 0
India Rubber Pref.	5½	5½	20/–	..	5 10 0
Intl. Combustion	32½	30	6	+¼	5 0 0
Johnson & Phillips	15	15	63/–	–1/6	4 15 4
Lancashire Dynamo	20	20	76/6	..	5 4 8
Laurence,Scott(5/–)	15	12½	10/–	..	6 5 0
London Elec. Wire	7½	7½	30/–	..	5 0 0
Lucas, J.	15	15	71/3xd	+1/6	4 4 0
Mather & Platt ..	10	10	45/9	+9d.	4 7 4
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	97/6	..	4 2 0
Pye Deferred (5/–)	25	25	19/6	–6d.	6 8 2
Revo (10/–) ..	20	17½	34/6	+6d.	5 1 5
Reyrolle	12½	12½	62/–	..	4 0 7
Siemens Ord. ..	7½	7½	28/6	..	5 5 2
Smith, S. (1/–) ..	50	37½	9/–	–3d.	4 3 4
Strand Elec. (5/–)	4	7½	5/6	..	6 16 4
Switchgear & Cowans (5/–) ..	15	10	11/3	..	4 9 0
T.C.C. (10/–) ..	5	5	15/–	..	3 6 8
T.C. & M... ..	10	10	45/–	..	4 9 0
Telephone Mfg.(5/–)	9	9	11/–	..	4 1 10
Thorn Elec. (5/–)	20	20	19/3	+3d.	5 4 0
Tube Investments	23¾	20	89/6	..	4 9 3
Vactric (5/–) ..	Nil	Nil	9/6	+6d.	—
Vickers (10/–) ..	10	10	18/3	..	5 9 7
Ward & Goldstone (5/–)	20	20	20/6	..	4 17 7
Westinghouse Brake	10	10	57/6	..	3 9 5
Walsall Conduits(4/–)	55	55	41/3	..	5 6 6
West, Allen (5/–)	7½	7½	6/6	..	5 15 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 766)

Electric Construction, Mather & Platt, Revo, and Vactric. Amongst the preference shares, Ferranti sevens are 1/16 up, at 28s. 9d. In the telephone list, Halls at 22s. 9d. have gained 1s. ; Telephone Properties at 12s. 9d. are 3d. lower.

Radio Shares

Cable & Wireless ordinary at 75 is 1½ down. Shares in companies connected with the radio business are in fairly active demand, it being generally understood that most, if not all, of the undertakings are fully occupied at the present time. The post-war prospects of the industry are good enough to arouse interest in shares in such companies, it being assumed that after the war there will be an enormous expansion in radio developments. Companies engaged in this branch will have, say the optimists, as much profitable work as they can possibly handle.

Overseas Shares

This group makes a mixed showing. Provincial buyers have given up to 22s. 3d. for Madras Electrics, and the nominal price of 21s. 6d. shows 1s. rise. East African Power are also 1s. up, at 24s. ; the interim dividend, now declared, is 3 per cent., the same as a year ago. Perak Hydro-Electrics after their recent spurt have come back to 11s. The dollar stocks are better, Shawinigan moving up to 18, Montreal to 26½, International "Tel. & Tel." to 8—a gain of 2 points, and Brazilian Tractions to 19½. Mexicans hold their gains. Victoria Falls hold closely to 80s.

British Columbia Electric

Not often seen in the market to any worthwhile extent, British Columbia Electric Railway 5 per cent. preference stock has come on offer, as to £10,000 at 113½. At this price the yield on the money is £4 7s. 6d. per cent. The company owns an electric railway, light and power business in the cities of Vancouver, Victoria and various other districts in British Columbia. The business has made steady progress during the past five years. The profits for the year ended December last showed £334,000 available to meet the £72,000 that is required for the annual dividend on the 5 per cent. preference stock now on offer.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1941

3314. "Lighting means for improving visibility in fog." Switchgear & Cowans, Ltd., and A. V. Maxwell. March 11th, 1941. (549264.)

4031. "Battery-driven motor vehicles." J. E. Bowker. March 25th, 1941. (549265.)

4846. "Broad-band high-frequency amplifiers." Standard Telephones & Cables, Ltd., P. K. Chatterjea and P. M. Brand. April 11th, 1941. (549266.)

6050. "Adjusting apparatus for effecting coarse and fine adjustments of a rotary member in radio apparatus." Marconi's Wireless Telegraph Co., Ltd. G. Payne and H. H. Lightfoot. May 9th, 1941. (549267.)

6086. "Electro-magnetic switching mechanisms." Associated Electric Laboratories, Inc. May 13th, 1940. (549243.)

6113. "Holders for thermionic valves." Standard Telephones & Cables, Ltd., M. M. Levy and A. S. Merritt. May 12th, 1941. (549301.)

7554. "Listening or sound locating apparatus." N. Herzmark. June 14th, 1941. (549311.)

7904. "Gyroscopic compasses." Sperry Gyroscope Co., Inc. June 22nd, 1940. (549312.)

7954. "Snap-action electric switches." C. L. Arnold, R. W. Dowsett and M. K. Electric, Ltd. June 25th, 1941. (549314.)

8738. "Electrical induction apparatus." British Thomson-Houston Co., Ltd. July 11th, 1940. (549253.)

9157. "Electric cables." Callender's Cable & Construction Co., Ltd. P. V. Hunter, H. J. Allcock and R. M. Fairfield. July 19th, 1941. (549269.)

9182. "Current-limiting arrangements for shunt motors." H. H. Gordon (Allmänna Svenska Elektriska Aktiebolaget). July 21st, 1941. (549318.)

9560. "Automatic electric arc welding apparatus." G. D. Peters & Co., Ltd., and B. W. Palmer. July 28th, 1941. (549221.)

9729. "Bell ringing apparatus." H. Nutt. July 31st, 1941. (549319.)

9957. "Coating of wires and the like with liquid composition." London Electric Wire Co. and Smiths, Ltd., E. L. Wildy and A. J. Sands. August 5th, 1941. (549255.)

10299. "Means for taking up slack in conductors supplying electric current to movable parts of machinery." Dorman, Long & Co., Ltd., and E. T. Judge. August 15th, 1941. (549180.)

11383. "Electric heating apparatus for liquids or foods containing liquids." R. Haddan (Moffats, Ltd.). September 5th, 1941. (549320.)

11444. "Protective apparatus for electric circuits." British Thomson-Houston Co., Ltd. (International General Electric Co., Inc.). September 8th, 1941. (Convention date not granted.) (549257.)

11699. "Broad-band amplifiers." Standard Telephones & Cables, Ltd. September 20th, 1940. (549272.)

12320. "Oil cooling systems for i.c. engines." British Thermostat Co., Ltd. and W. F. F. Martin-Hurst. September 23rd, 1941. (549259.)

13067. "Mechanical brake mechanism." British Thomson-Houston Co., Ltd., and T. H. Petch, jun. October 10th, 1941. (549261.)

13231. "Electric-discharge tubes." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). October 14th, 1941. (549275.)

13620. "Protective systems for electric circuits." British Thomson-Houston Co., Ltd. October 26th, 1940. (549276.)

13987. "Radio measuring systems." Marconi's Wireless Telegraph Co., Ltd. October 31st, 1940. (549186.)

14788. "Production of glass coatings on objects of materials having high melting points." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). November 17th, 1941. (549277.)

14892. "Cathode-ray tubes of the wall-coated type." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). November 19th, 1941. (549278.)

1942

804. "Time switches." British Thomson-Houston Co., Ltd. January 21st, 1941. (549193.)

2796. "Means for testing and selecting electrical circuits, particularly in automatic telephone systems." Western Electric Co., Inc. February 8th, 1941. (549324.)

2925. "Automatic telephone systems." Western Electric Co., Inc. February 8th, 1941. (549325.)

3592. "Apparatus for grading powdered material." International Combustion, Ltd., and W. F. Harlow. March 18th, 1942. (549199.)

4003. "Electric lamps." British Thomson-Houston Co., Ltd. March 28th, 1941. (549226.)

4415. "Cabinets, particularly for refrigerators." British Thomson-Houston Co., Ltd. (General Electric Co.). April 2nd, 1942. (549229.)

4678. "Electric heaters for thermally responsive devices. Igranic Electric Co., Ltd. (Cutler-Hammer, Inc.). April 9th, 1942. (549288.)

4683. "Method of, and apparatus for, insulating an electric conductor." Okonite Co. May 21st, 1941. (549230.)

4856. "Mountings for electro-magnetic interrupters or vibrators." Plessy Co., Ltd. July 1st, 1941. (549231.)

6409. "Construction of capacitors." Sangamo Weston, Ltd. June 12th, 1941. (549292.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Belfast.—December 15th. Town Council. 400 pairs fishplates, 400 tons tramway rails, B.S.S. No. 7, and 10 tons (approx.) cadmium copper trolley wire. Form of tender, conditions, etc., from the acting general manager, Transport Department, Sandy Row.

Manchester.—January 5th. Electricity Department. Two electrically-driven capstans and four bollards. (See this issue.)

Orders Placed

Bromsgrove. — Urban District Council. Accepted. Electrical installations at Bromsgrove and Rubery fire stations (£104).—Abel & Smith's Electrical Co., Ltd. (Worcester).

Liverpool.—Electric Power and Lighting Committee. Accepted. Vacuum drying tank for drying out certain transformers (£2,460).—Metropolitan-Vickers Electrical Co., Ltd.

Manchester. — Electricity Committee. Accepted. High-pressure steam pipework.—Babcock & Wilcox, Ltd. Valves.—Hopkinsons, Ltd. Traction battery.—Chloride Electrical Storage Co., Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birkenhead.—Houses, Park West Road; Thompson & Moulton.

Boston.—Hall, Ratlinghope; H. R. Hayward, Ratlinghope Village Hall Committee.

Bromsgrove.—Public library; F. W. Goodman, surveyor, Council House.

Burnopfield.—Miners' canteen; H. Kindred, Roseville, Sunniside, Whickham, Co. Durham.

Caernarvonshire.—Feeding centre, Llanllechid; W. Lloyd Jones, county architect, County Buildings, Caernarvon.

Cambridge.—Sub fire station; borough surveyor's office, Guildhall.

Carlisle.—Nursery, Raffles estate; city engineer, 18, Fisher Street.

Cheshire.—Day nursery at Cheadle and Gatley; E. M. Parkes, county architect, The Castle, Chester.

Chesterfield.—Houses, Boythorpe Road; W. S. Wilson, borough surveyor, Town Hall.

Crayford.—Messroom and recreation room for Civil Defence personnel (£850); F. Turner, surveyor, Municipal Buildings, Crayford, Kent.

Fifeshire.—Reinstatement work at Pittenweem police station (electric lighting); G. Sandilands, county master of works, County Offices, Kirkcaldy.

Frodsham.—British Restaurant, Stockton Heath; A. J. King, surveyor, Castle Park, Frodsham, via Warrington.

Great Houghton.—Church; Vicar, Great Houghton Chapel-of-Ease, near Barnsley.

Heston and Isleworth.—Nurseries, Heston and Hounslow West; H. Swann, town clerk, Council House, Hounslow.

Hinckley.—Houses at Hinckley, Barwell, Earl Shilton, Burbage and Stoke Golding; J. S. Featherston, surveyor, Council House.

Jarrow.—Extensions to Danesfield maternity home, and school feeding centre; J. S. Weir, borough engineer, Town Hall.

Kilmarnock.—A.R.P. equipment store at cleansing station (heating and electric lighting); burgh surveyor, 7, Green Street.

London.—BALHAM.—Huts, sorting sheds, etc., at 45, Nightingale Lane; C. H. Gibson, Ltd., London Road, Thornton Heath.

CLAPHAM.—Additions to works; Holcombe & Betts, architects, Portman Street, W.1.

WANDSWORTH.—Office, Southfield, for aluminium Plant & Vessel Co.; Adie Button & Partners, architects, St. George Street, Hanover Square, W.1.

Marley Hill.—Canteen for John Bowes & Partners; Shield Bros., Ltd., Bach Park Terrace, Swalwell, Co. Durham.

Newcastle-under-Lyme. — Electric heating system at mortuary; A. Cotton, borough surveyor, Municipal Offices.

Portsmouth.—Combined hospital; Royal Portsmouth Hospital Management Committee.

Rotherham. — Workshop; Allott Bros. & Leigh, Ltd., Ickles Forge.

Salford.—Nursery, Hadfield Street (£1,773); Jones & Rawlinson, Ltd.

Seaham Harbour.—Communal feeding centres at Dawdon and Deneside; J. B. Abbey, surveyor, U.D.C. Offices.

Sheffield.—Branch stores, Parson Cross; secretary, Brightside & Carbrook Co-operative Society, Ltd., Exchange Street.

Works additions; W. A. Tyzack & Co., Ltd.

Works extensions, messroom and offices; Ellacott & Co., Ltd., Robert Street.

Shrewsbury. — Wartime nursery, Sentinel Gardens; borough engineer, Dogpole, Shrewsbury.

Stafford.—Works for Staffordshire, Wolverhampton & Dudley Joint Hospital Board; C. M. Coombs, County Buildings, Stafford.

Sunderland.—Garage; R. T. Nixon, 86, Fulwell Road.

Control room, etc., Fulwell; R. H. Patterson, Central Fire Station.

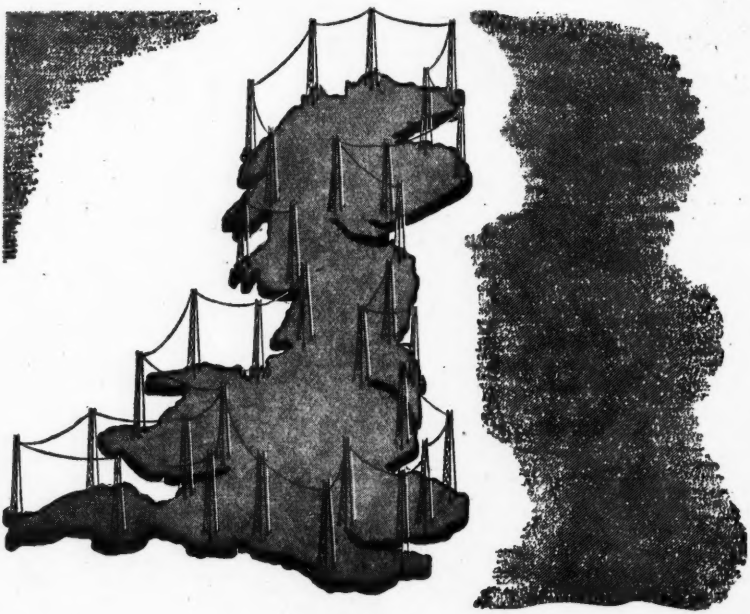
Test room, etc., for A. E. Nelson; Matkin & Hawkins, Barclays Bank Chambers,

Sub-station; D. & J. Ranken, Stockton Road.

SPECIFY BAKER CONTACTS

WHEN DESIGNING ELECTRICAL EQUIPMENT

BAKER PLATINUM LTD. 52 HIGH HOLBORN, LONDON, W.C.I



Wired for ACTION!

LIFE moves by electric cable these modern days. Think for a moment of the multitude of things that depend on electric cables—large or small. A ringing door bell, a domestic cooker, a vast cross-country system bringing power and light to factories and homes.

For more than three decades the General Cable Manufacturing Co. Ltd., has been making cables for all electrical purposes, and their rapid growth is the measure of the quality of their products. In present circumstances supplies tend to be short and deliveries may be a little below the pre-war standard of promptness. These are conditions forced upon us; in spite of them we do our utmost to satisfy our customers.

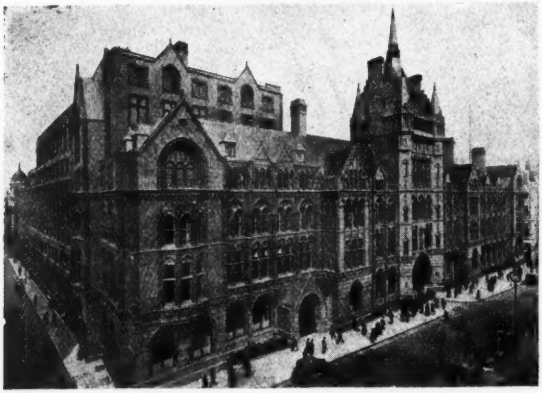
ELECTRIC GCM CABLES

THE GENERAL CABLE MANUFACTURING CO. LTD.

LEATHERHEAD, SURREY

ALUMINIUM
CANS
FOR ELECTROLYTIC
CONDENSERS
Full range required by various Government Departments now available. Other sizes and shapes made to requirements. Work for H. M. Government only can be supplied.
JOHN DALE LTD
NEW SOUTHGATE · LONDON · N·11 (Enterprise 1167)

FUEL ECONOMY *IN THE* BOILER HOUSE



The illustration shows the Chief Office of the Prudential Assurance Company, Ltd.—to whom we are indebted for permission to reproduce this photograph—where is installed Electrical CO_2 Equipment for combustion control in the Boiler House.

ELLIOTT BROTHERS (LONDON) LIMITED
CENTURY WORKS, LEWISHAM, S.E.13

▪ ▪ ▪ *AN URGENT WAR-TIME NECESSITY*

We supply instruments and control panels for Boiler Plants and Industrial Heating Installations, including the following:

CO_2 Measuring Equipment (Flue Gas Analysis)—for efficient combustion control and consequent fuel economy.

Flowmeters—for economy in steam consumption.

Temperature Indicators and Recorders—for steam, water and flue gas temperatures and other vital information.

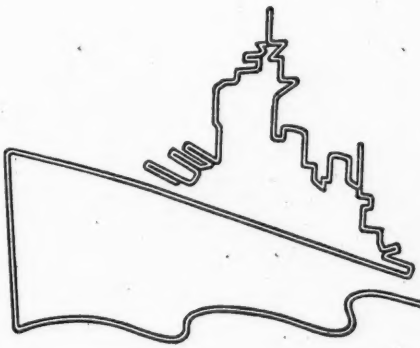
Watch the Heat Losses . . . . and save fuel!

McKECHNIE
BROTHERS LIMITED
ROTTON PARK STREET, BIRMINGHAM 16

The Makers of "*Tank*" *Brand* Non-Ferrous Metal Alloys, including:—
Extruded Brass and Bronze Rods and Sections, Brass and Bronze Stampings, Gun Metal and Phosphor Bronze Ingots, Chill Cast Gunmetal and Phosphor Bronze Bars and Terne Metal and Cupro Nickel Ingots and Granules, regret their inability to satisfy all the requirements of clients for their products for the time being.

However, the complete satisfaction of clients, old and new, is their chief concern, and when Peace returns to the World again, they will strive to satisfy all, and prove to new friends that their products are second to none. They are grateful for the understanding and forbearance already shown to them in these difficult times.

POWER FOR ARMS PRODUCTION MUST NEVER FAIL

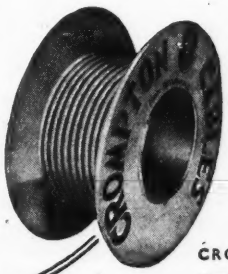


SPECIFY

CROMPTON

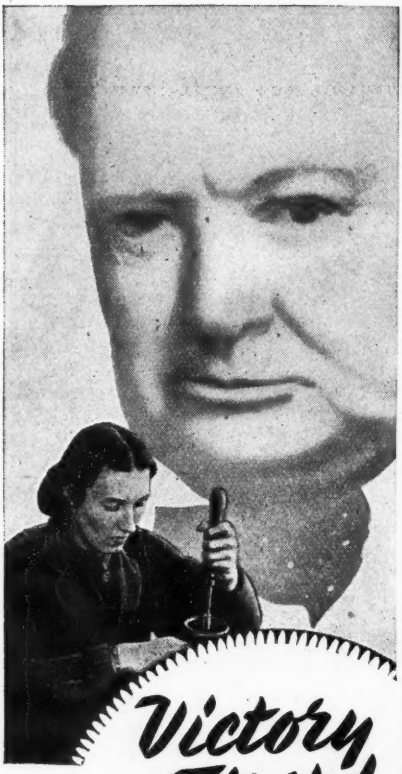
V.I.R.

CABLE



CROMPTON PARKINSON LIMITED
ELECTRA HOUSE
VICTORIA EMBANKMENT LONDON W.C.2
Temple Bar 5911 *Crompark, Estrand, London*

D



Victory First!

'Austerity' is the watchword for the peoples of the United Nations. In sacrificing luxuries and even former necessities we enable our resources to be more rapidly mobilised for the defeat of the Axis powers. When the better things of life once more become available those most entitled to their enjoyment are the millions now fighting and toiling for Victory!

A Tribute to the War-Workers of the Nation.

ELEXCEL LTD. LONDON & LIVERPOOL

Makers of XCEL *Electric Cookers*

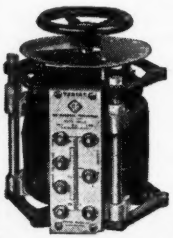
OLD UNCLE TOM COBBLEY AND ALL....

When we recite the list of the Chief American manufacturers of Laboratory and semi-Laboratory apparatus whom we represent:

General Radio Company
Allen B. DuMont Laboratories Inc.
Hygrade Sylvania Corporation
Clarostat Manufacturing Co., Inc.
Simpson Electric Company
G.M. Laboratories Inc.
Monarch Manufacturing Co.
Raytheon Manufacturing Co.
The National Company Inc.
The Hickok Electrical Co., Inc.

the facetious might tend to add "Old Uncle Tom Cobbley and all." But if we may take ourselves seriously for a moment we would like to point out that this formidable list is really important. It means that researchists and works engineers have, in this Country, a convenient and readily available means of obtaining many types of equipment which are not obtainable from any other source. It means that there is somebody here who can give authoritative advice as to the type of equipment which *is* and *is not* likely to be available. It means that there is somebody who knows the right way to go about getting such instruments rapidly imported. If your requirements are, therefore, of a truly essential nature the moral is obvious—contact Claude Lyons Ltd.

Claude Lyons

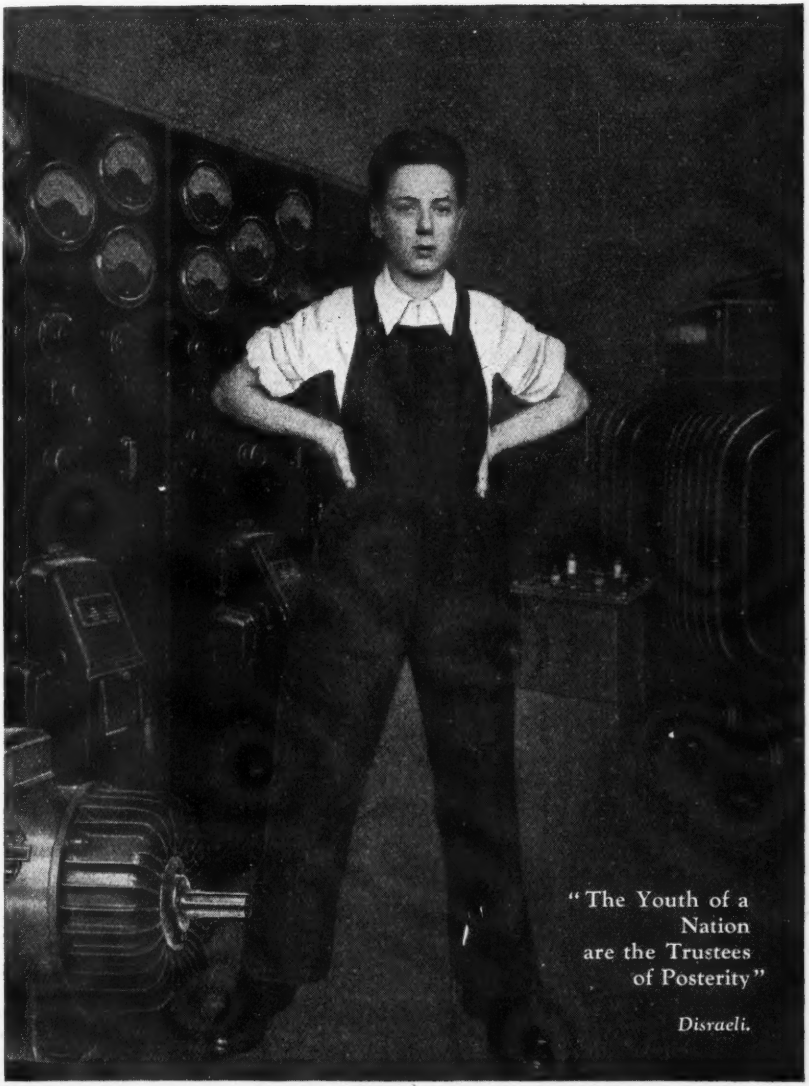


"VARIAC"
Voltage Controls
Now made in England

Write for Bulletin 424-B and 742 for Complete Data

Claude Lyons LTD
ELECTRICAL AND RADIO LABORATORY APPARATUS ETC.

180 Tottenham Court Road, London, W.1
Telephone: MUSeum 3025/6
76 Old Hall Street, Liverpool 3, Lancs



FOSTER TRANSFORMERS & SWITCHGEAR LTD.
(INCORPORATING FOSTER ENGINEERING COMPANY) SOUTH WIMBLEDON LONDON S.W.19

Branches :—
Birmingham, Bristol, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Sheffield.
Associated Companies:—**Lancashire Dynamo & Crypto Ltd., Manchester. Crypton Equipment Ltd., Willesden.**
D*

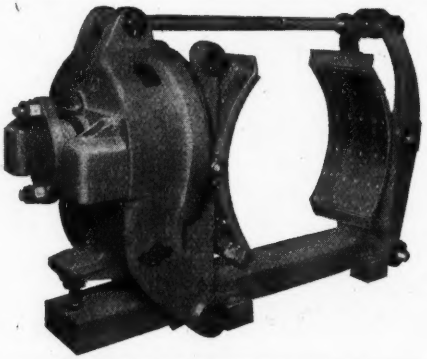
IGRANIC MAGNETIC BRAKES

Igranic Type "M" Brakes are for D.C. Service and embody a direct action mechanism eliminating all toggles.

Outstanding features :

Short Shoe Stroke
Simple Rugged Steel Construction
Compact Design

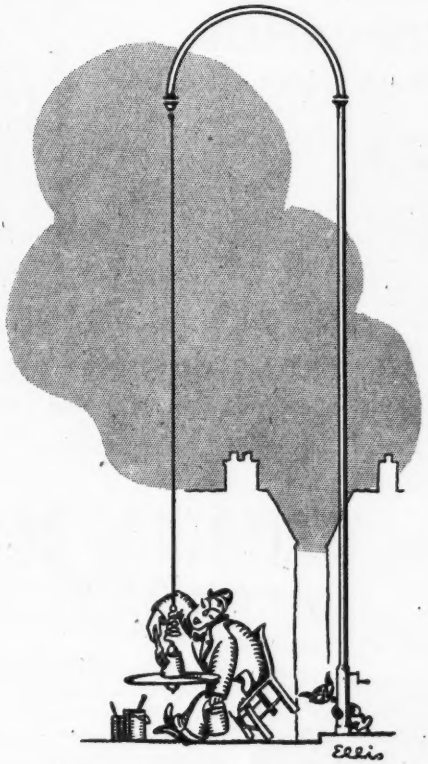
Other Igranic Magnetic devices include :—
Lifting magnets, Separators, Clutches, Solenoids, etc.



IGRANIC ELECTRIC CO. LTD.
LONDON • BEDFORD

Write for Leaflets giving details of our Magnetic specialities

Standard finish!



This description suggests a quality something short of perfection. An erroneous impression, we assure you, since the gentleman uses nothing but the finest materials.

TITANINE

LACQUERS • PAINTS • VARNISHES • ENAMELS

TITANINE LIMITED COLINDALE LONDON N.W.9 TELEPHONE COLINDALE 8123

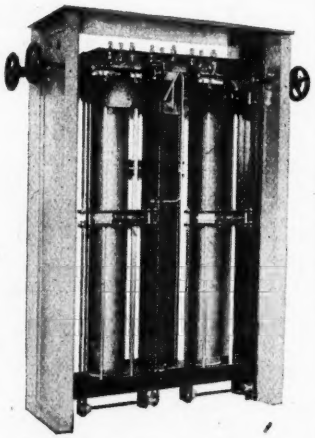
The "BRECO"

ON-LOAD REGULATING TRANSFORMER

WITH STEPLESS REGULATION

OUTSTANDING ADVANTAGES for Control of

INDUSTRIAL FURNACES
LABORATORY FURNACES
RECTIFIER PLANTS
TESTING PLANTS
X-RAY EQUIPMENTS
LIGHTING SYSTEMS



BRENTFORD TRANSFORMERS LTD.
BRECO WORKS, BRENTFORD, MIDDLESEX

High Efficiency **WATERTUBE BOILERS**
by **CLARKE CHAPMAN & CO. LTD**

We are supplying Steam Generating Plant designed on latest modern practice suitable for high pressures, heavy duties and highest efficiencies, to the requirements of Power Stations, Collieries and Industrial Plants. The Clarke, Chapman system of Pulverised Fuel Firing is widely used, and details may be had on application.

We now include in our range the
LA MONT *forced circulation* **BOILERS**

CLARKE, CHAPMAN & CO., LTD
Temporary London Office :
29 CASTLEBAR RD., EALING, W.5
TELEPHONES : - - *Perivale* 2254/5
TELEGRAMS : Cyclops, Phone, London

stripped water

In preparing flax and hemp for ropes it is first stripped from its stem, slit into lengths and scraped through a bamboo instrument until only clean fibre remains. This extensive preparation of stripping, slitting and scraping is essential to produce a first-class quality fibre.

The stripping of water of its scale-forming and soluble salts for use as boiler feed is effected by the Permutit "Deminrolit" Process which, not only obtains the results without the use of heat or steam, but also eliminates ammonia and corrosion of condensers.

The modern method of feed water treatment and conditioning is described in our Technical Publication "Distilled Water without Distillation" which will be forwarded on application to The Permutit Company Limited, Dept. T.W., Gunnersbury Avenue, London, W.4. Chiswick 6431.

CONDENSING PLANT

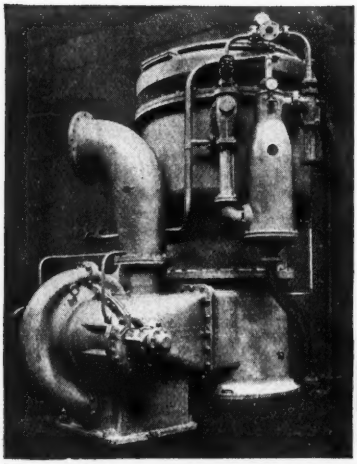
Surface and Jet Types

and all

AUXILIARY EQUIPMENT

from

Turbine Flange to Boiler Check Valves

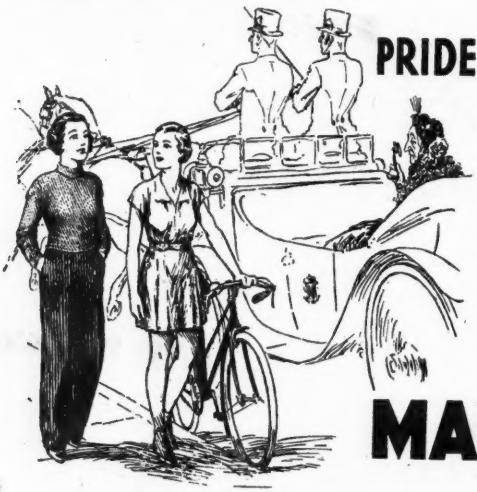


The illustration shows a Hick Hargreaves Low Level Jet type Condensing Plant with "Hivac" Ejector and split casing Extraction Pump working in conjunction with a 5,000 kW. Turbo-Alternator.

HICK HARGREAVES
AND COMPANY LIMITED

Phone: 1373 (3 lines) **BOLTON** Grams: "Hick, Bolton"

AD 48 C



PRIDE & PREJUDICE

Your grandmother wouldn't approve of shorts and slacks—but your daughter may have more modern ideas!

Modernise your tool-room with the Macrome tool-toughening treatment and give your workmen a fair chance!

During the past six years thousands of important engineering firms have literally doubled and trebled the average output from their tools by having them Macrome treated—why not you? Write for proof!

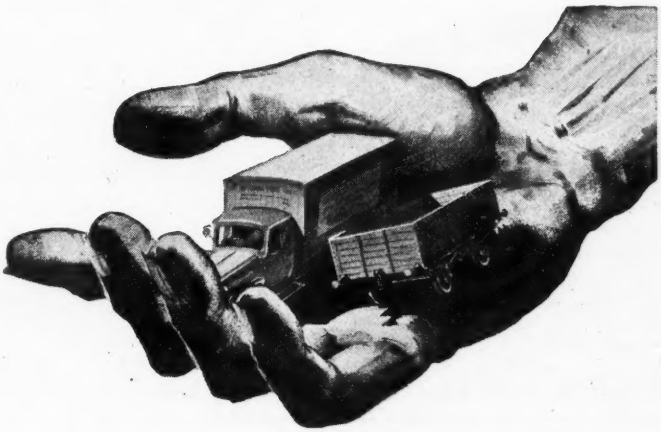
MACROME
LIMITED

ALCESTER, WARWICKSHIRE

Phone: ALCESTER 175

LONDON, GLASGOW, MANCHESTER, BRISTOL, LEEDS, BIRMINGHAM

These are LENT TO YOU, when will you send them back?



HUNDREDS of thousands are toiling with hand and brain to fit our transport system for its great war tasks. Millions of pounds have been spent, great schemes of improvement carried through to make it more efficient.

But the "system" is useless and the plans will fail if wagons and lorries, ships and canal boats, stand idle in loading bays and sidings, docks and wharves, when they could and should be away on new journeys.

That is something *you* control. Watch your loading and unloading. Cut ten minutes out of each hour of standstill time. That's what the nation asks of you — what it *needs* from you.

You know your own problems best. Tackle them in your own way — But tackle them now. Plan, encourage ideas, improvise if needs be.
Here's a starting-off agenda:

1. CHECK OFFICE ARRANGEMENTS
2. LABOUR-SAVING EQUIPMENT
3. BLACK-OUT WORKING
4. OPINIONS OF "MEN WHO DO THE WORK"

WE MUST GET AN EVEN QUICKER TURNROUND

Ministry of War Transport

6

BARBOUR'S

FOR LACING SWITCHBOARD CABLES

FLAX LACING THREAD

also **BINDING LINEN THREAD**
No. 30. 3 cord Beeswaxed to P.O. Specification, on 2-oz. cops.

WM. BARBOUR & SONS LTD. • LISBURN • N. IRELAND

Mirrlees'

POWER STATION
EQUIPMENT

SURFACE AND JET CONDENSING PLANT
EVAPORATORS AND DE-AERATORS
LOW AND HIGH PRESSURE HEATERS
STEAM EJECTOR AIR PUMPS
CONDENSATE EXTRACTION AND
CIRCULATING WATER PUMPS

The MIRRLEES WATSON COMPANY LIMITED
ENGINEERS GLASGOW

Efficient use of Fuel in all forms is essential

SIEMENS
ELECTRIC LAMPS

convert Electrical Energy into ***LIGHT*** *with the utmost possible Efficiency*

MADE IN ENGLAND

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield,

---

PRESSINGS
in all metals
also
HOT STAMPINGS
in Brass & Aluminium Alloys
Small Machined **BRASSWORK**
and Brass Castings
CAPSTAN & AUTO PRODUCTS

WRIGHT, BINDLEY & GELL LTD. BIRMINGHAM, 11 VICTORIA 8205 (P.B.X.)

...and NOW "ONE TONNERS"

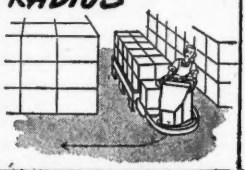
This new addition to the famous Ransomes range of Electric Industrial Trucks is a "one tonner." The truck illustrated is the T.E.2L with low elevating platform, 4 ft. 10 in. by 3 ft. 4 in. for use with stillages.

It is of the 3-wheeled type, with the drive on the front wheel, and is of robust construction of extremely simple design.

The truck is easily operated, thereby saving fatigue, and turns in a radius of less than its own length.

Write for full particulars

DESIGNED TO MEET TODAY'S DEMAND FOR A SMALL CAPACITY TRUCK WITH A SMALL TURNING RADIUS

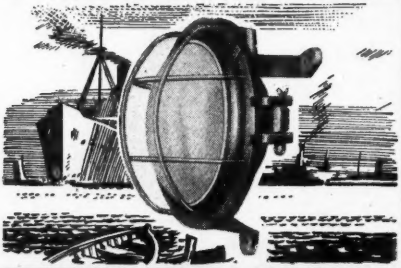


Ransomes ELECTRIC *Industrial* TRUCKS

RANSOMES, SIMS & JEFFERIES LTD., DEPT E.R. ORWELL WORKS, IPSWICH

CMC

CHURCHOUSE



Lighting Fittings FOR Merchant Ships

C. M. CHURCHOUSE LTD., CLARENDON WORKS, CLARENDON CROSS, LONDON, W 11

DS Trade Mark

H.C. COPPER WIRES AND STRIP

ENAMELLED
TO B.S.S. 156—1936

ENAMELLED
AND
PAPER LAPPED
VARNISHED OVERALL

COTTON COVERED

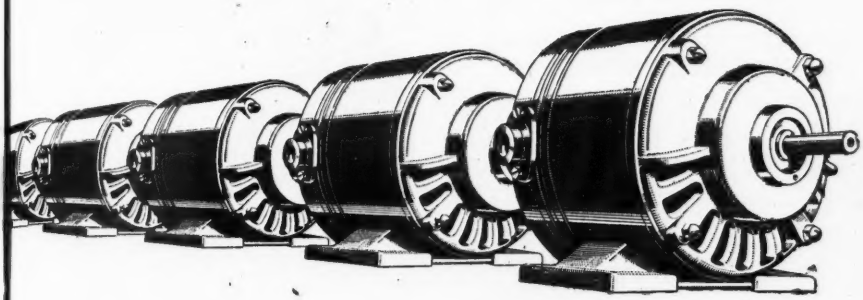
Samples and Prices on Application

MADE BY :—

F. D. SIMS LTD.

HAZELHURST WORKS, RAMSBOTTOM, LANCS

Telegrams: "SIMS, RAMSBOTTOM." *Telephone:* RAMSBOTTOM 2213/4



Power to Spare

Crompton "Minor" Motors are always capable of that "little more" when it is needed. It is because they are given that "little more" in manufacture.

CROMPTON PARKINSON
Limited

CLEAN, PERMANENT MARKING
ON
BAKELITE, METAL, GLASS, WOOD
COMPONENT PARTS, Etc.

LARGE OR SMALL ARTICLES OF ANY SHAPE
PRINTED BY ONE SIMPLE MACHINE
Adopted in place of engraving by many leading manufacturers

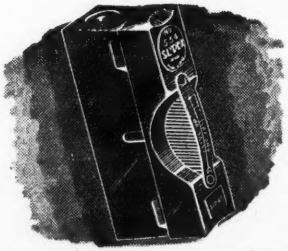
REJAFIX Ltd. 75 BAKER STREET LONDON, W.1
Tel. : Welbeck 1979

Once again this troubled earth of ours has circled the sun and Father Time reintroduces our old friend Father Christmas. That the choice and sale of timepieces will soon be once more a happy feature of the Christmas season is the sincere wish of the Directors and Staff of Smith's English Clocks Ltd., who gladly take this opportunity of extending heartiest greetings to their many friends throughout the trade.

SMITH CLOCKS
"Sectric" and Lever
Issued by SMITH'S ENGLISH CLOCKS LTD., Cricklewood Works, London, N.W.2

★ More is required for protection than merely a detachable device to hold the fuse wire in circuit. The SLYDLOK Fuse is designed to meet the needs of to-day—questions of vibration, neglect, space, identification and adaptability are *all* answered by the SLYDLOK design.

SLYDLOK FUSES



VIBRATION PROOF

EDWARD Wilcox & CO LTD

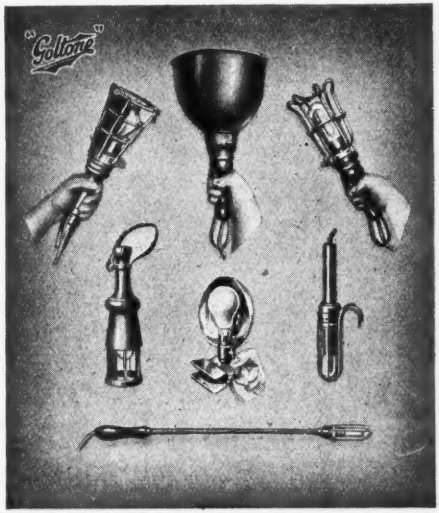
Whilst producing to maximum capacity, orders can be dealt with in rotation.

Sharston Road, Wythenshawe, MANCHESTER
dm813

"CONSOL" Shelters for KEY PERSONNEL

ASK FOR LIST E.R./852

CONSTRUCTORS
TYBURN ROAD. BIRMINGHAM. 24.



INSPECTION LAMPS

Complete with shockproof switch or ordinary holders.

VARIETY OF TYPES TO MEET ALL CONDITIONS, INCLUDING SHELL INSPECTION AND CLIPLITE PATTERNS.

EARLY DELIVERIES AGAINST PRIORITY DEMANDS.

See Catalogue BH/1039 for full description.

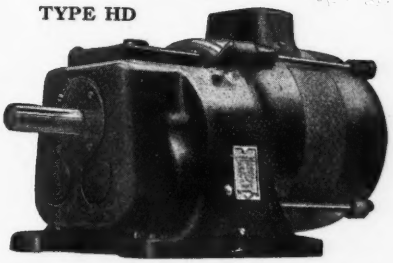
A.I.D. FULLY APPROVED.

WARD & GOLDSTONE LTD. PENDLETON, MANCHESTER. 6.
ESTABLISHED HALF A CENTURY

NECO
Registered *Trade Mark*

GEARED MOTORS

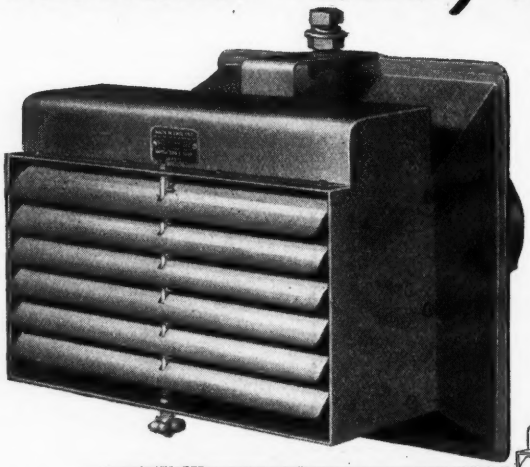
TYPE HD

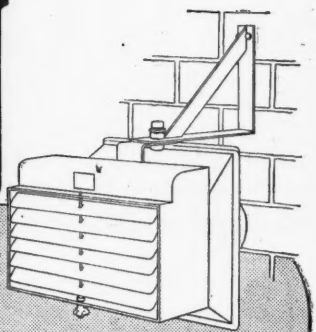


The
NORMAND ELECTRICAL COMPANY LTD.
North St., Clapham Common, London, S.W.4
Telephone: MACaulay 3211/4

E.G.B.52

Essential Factory Equipment





G.E.C.
ELECTRIC UNIT HEATERS

Both for the new building which has to be ready for use in the shortest time, and for adding efficient heating to existing buildings, these unit heaters offer unique advantages :—

- THEY NEED NO FLOOR SPACE, NO BOILER HOUSE, NO FUEL, AND NO OPERATING LABOUR.
- IN RELATION TO HEAT OUTPUT THEY ARE OF THE SMALLEST SIZE AND USE THE LEAST AMOUNT OF METAL.
- LOWEST CAPITAL COST. LOW OPERATING COSTS.
- EACH UNIT CAN BE WORKED INDEPENDENTLY, WITH OR WITHOUT THERMOSTATIC CONTROL.

G.E.C. heating engineers are always available to advise and prepare schemes and specifications for space heating of any magnitude.

Advt. of The General Electric Co., Ltd. Head Office : Magnet House, Kingsway, London, W.C.2